



CONTRACT JW14301R
LINBRO WATER UPGRADE



TENDER COVER PAGE

MBD 1

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF JOHANNESBURG WATER

BID NUMBER: JW14301R

CLOSING DATE: 06 SEPTEMBER 2024

CLOSING TIME: 10:30 AM

DESCRIPTION: LINBRO WATER UPGRADE

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

BRIEFING SESSION	COMPULSORY
BRIEFING DETAILS	DATE AND TIME: 14 AUGUST 2024 AT 11:00 ADDRESS: ZANDFONTEIN NORTH DEPOT, 5 COMMERCE CRESCENT WEST, SANDOWN, SANDTON, 2031 VENUE: WORKSHOP 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	CAPEX	DEPARTMENT	SCM
CONTACT PERSON	NSUKU SHIBAMBU	CONTACT PERSON	NTHABISENG MORE
TELEPHONE NUMBER	011 688 6674	TELEPHONE NUMBER	011 688 1512
E-MAIL ADDRESS	NSUKU.SHIBAMBU@JWATER.CO.ZA	E-MAIL ADDRESS	NTHABISENG.MORE@JWATER.CO.ZA



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NOTE: HARD COPY TENDER DOCUMENTS ARE AVAILABLE AT A COST OF R350.00 PER SET. 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 MEMORAY 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:



PART B TERMS AND CONDITIONS FOR BIDDING

1. BID SUBMISSION:

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

2. TAX COMPLIANCE REQUIREMENTS

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

3. QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

- 3.1. IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)? ☐ YES ☐ NO
- 3.2. DOES THE ENTITY HAVE A BRANCH IN THE RSA? ☐ YES
☐ NO
- 3.3. DOES THE ENTITY HAVE 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.



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. JW14301R: - LINBRO WATER UPGRADE

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 05 August 2024.

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 by no later than 10:30 am on 06 September 2024. 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.



Contract JW14301R
DESCRIPTION: LINBRO WATER UPGRADE
Volume 1 Tender and Contract
Section T1 Tender and Contract



Johannesburg Water SOC Ltd



CONTRACT NO: JW14301R

LINBRO WATER UPGRADE

VOLUME 1

TENDER AND CONTRACT

Prepared by
PMU
PO Box 61542
Marshalltown
2107

V2.0
August 2023



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.		•		
	MAAA No. for Tax Compliant Status		•		
2	Mandatory Documents at Particular Stage:				
	CIDB grading of 8CE or 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	•			
3	Administrative Documentation:				
	T2.1 Signed Certificate of Authority to Sign	•	•		
	MBD 1 - Invitation to Bid - Completed and signed	•	•		
	Central Supplier Database Registration	•			
	T2.2.4 MBD 4 - Declaration of interest - Completed and signed	•	•		
	MBD 5 - Declaration for procurement above R10 Million (all applicable taxes included) - Completed and signed.	•	•		
	MBD 6.1 - Preference Points Schedule – Specific Goals and Price Points - Completed and signed.	•			

Employer:		Contractor:	
Witness:		Witness:	



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)
T2.2.4	MBD 8 - Bidder's past supply chain management practices – Completed and signed.	•	•		
T2.2.4	MBD 9 - Certificate of Independent Bid Determination – Completed and signed.	•	•		
	Municipal Rates and Taxes for the 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.	•	•		
	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.	•	•		
4.	Functionality Documentation:				
	Documentary Evidence Required for Criteria 1 – (Contactable Reference Letters and Completion / Final Approval Certificates)	•			
	Documentary Evidence Required for Criteria 2 – (CV, qualifications and valid registration)	•		•	
	Documentary Evidence Required for Criteria 3 – (CV, qualifications and valid registration)	•		•	

Employer:		Contractor:	
Witness:		Witness:	



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 4 – (CV, qualifications and valid registration)	•		•	
	Documentary Evidence Required for Criteria 5 – (Site specific method statement)	•		•	
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 or Specifications	•			
7.	Pricing Schedule:				
	Bill of Quantities/ Schedule of Quantities. completed	•			
	Alterations authenticated – Refer to Acknowledgment of Tender Conditions	•			
8.	Site Information:				
	Site Information	•			
9.	Occupational Health, Safety and Environmental Specification				
	Acknowledgement of SHE Specification & Annexures	•			
10.	Tender Drawings:				
	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			•	
	Valid Registration with Compensation for			•	

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)
	Occupation Injuries and Diseases Act				
	Performance Security – where applicable for industrial related services			•	
	Comprehensive Health and Safety Plan (compliance with OHSE Specification - if applicable)			•	
	Bank Details Form			•	

Tenderers will be notified of any omitted, outstanding, missing and or incomplete administrative documents and will be offered a period of 3 days to complete or submit those pages i.e., Municipal Bidding Documents (MBD), authority to sign and other administrative documents that require completion and signatures. These exclude documentation on functionality, price 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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Johannesburg Water (SOC) Ltd



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VOLUME 1

PART 1: TENDERING PROCEDURES



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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 T2.2 Returnable Schedules, including the Enterprise Declaration Affidavit which may be bound in a separate volume Contract Part 1: Agreement and Contract Data C1.1 Form of Offer and Acceptance C1.2 Contract Data C1.3 Forms of Securities Contract Part 2: Pricing Data C2.1 Pricing Instructions C2.2 Bill of Quantities Volume 2 Contract Part 3: Scope of Work C3.1 Scope of Work C3.2 Particular Specifications Contract Part 4: Site Information C4 Site Information Volume 3 Occupational Health, Safety and Environmental Specification Environmental Management Plan Volume 4 Tender Drawings



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Clause number	Tender Data
C.1.4	The Employer's representative is: Contact Person: Nsuku Shibambu Telephone: 011 688 6674 E-mail address: Nsuku.shibambu@jwater.co.za The SCM representative is: Contact Person: Nthabiseng More Telephone: 011 688 1512 E-mail address: Nthabiseng.more@jwater.co.za
C.2.1	Eligibility criteria and requirements CIDB registration and grading: 1) Only tenderers who are registered with the CIDB and were capable of being so prior to the evaluation of submissions, in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered for an 8 CE class of construction work, are eligible to submit tenders. Tenders must have an Active status at the required CIDB grading at time of tender evaluation for the bidder to meet the eligibility criteria and requirement. 2) Joint ventures are eligible to submit tenders provided that: i) every member of the joint venture is registered with the CIDB; and ii) the combined contractor grading designation calculated in accordance with the CIDB Regulations is equal to or higher than a contractor grading designation determined in accordance with the sum tendered for an 8 CE 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.
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.



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Clause number	Tender Data
	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.2.12.2	Failure to complete bid amount on the form of offer and sign full will result in the elimination of the tenderer.
C.2.13.3	Each tender offer shall be submitted as an original. Tenderers are also requested to submit a soft copy in a USB (Tenderers who do not submit a soft copy will not be disqualified)
C.2.13.5	The Employer's address for delivery of tender offers and identification details to be shown on the Tenderer's offer package are: 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, <i>as well as the Tenderer's name, their Authorised Representative's name, postal address and telephonic contact numbers.</i>
C.2.13.6 & C.3.5	A two-envelope procedure will not be followed.
C.2.15.1	The closing time for submission of tender offers is as stated in the Tender Notice and Invitation to Tender.
C.2.16	The tender offer validity period is 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.2.23	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:



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	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; 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 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. i) No Tenderer shall make any attempt to obtain particulars of any relevant information, other than that disclosed at the opening of tenders



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Clause number	Tender Data
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; 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.



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Clause number	Tender Data
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 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.



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	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. 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 border="1"> <thead> <tr> <th>STAGE</th><th>DESCRIPTION</th></tr> </thead> <tbody> <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> </tbody> </table>	STAGE	DESCRIPTION	Stage 1	Mandatory Evaluation	Stage 2	Administrative Evaluation	Stage 3	Technical Evaluation
STAGE	DESCRIPTION								
Stage 1	Mandatory Evaluation								
Stage 2	Administrative Evaluation								
Stage 3	Technical Evaluation								



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Clause number	Tender Data				
	<u>Stage 1: Mandatory Evaluation</u>				
	Description			Complied	
	No	Description	Yes	No	
	1	CIBD grading 8 CE or higher. Active Status at the required CIBD grading or higher at the time of Evaluation			
	2	Mandatory Tender Briefing Meeting			
	3	Form of Offer Completed and Signed			
	Tenderers who FAIL to meet the mandatory criteria or requirements of tender will result in disqualification.				



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Clause number	<u>Tender Data</u>				
	<u>Stage 2: Administrative Evaluation</u>				
	Description				Complied
	Reference	Description	Requirement	Yes	No
	Certificate of Authority	Signed Certificate of Authority to Sign or signed board resolution	Completed and signed certificate of authority to sign or signed board resolution		
	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		



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Clause number	Tender Data				
	Description			Complied	
	Reference	Description	Requirement	Yes	No
	Annexure – of Proof 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 CIPC registration document showing percentage of ownership and share certificate where applicable	Submit applicable documentation with the tender submission		
	Annexure – of Proof 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 CIPC registration document showing percentage of ownership and share certificate where applicable	Submit applicable documentation with the tender submission		
	Annexure – of Proof 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 T2.2.4	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		



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Clause number	Tender Data				
	Description			Complied	
	Reference	Description	Requirement	Yes	No
	Annexure T2.2.4	Municipal statement of account for Director/s (not older than three (03) months from the closing date of tender or a valid lease agreement at time of tender closure)	Submit applicable documentation with the tender submission		
	Annexure	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.				



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Clause number	<u>Tender Data</u>					
	<u>Stage 3: Technical Evaluation</u>					
CRITERIA NO #	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAX SCORE	SCORE
1	Tenderers Experience with Respect to Steel Pipe Projects of Diameter 800mm or More	Supporting Documents Required include Reference Letters as per T2.1.6 (Or on Client Letter Head with all required Information) and Completion / Final Approval Certificates. Note: <i>This reference letter must be completed by the referee/previous client of the tenderer and included in the tender submission. Alternatively, the Clients letterhead may be used provided it complies with the functional requirements. A separate form must be completed for each reference as a requirement in the evaluation criteria. The information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting in participating in any future government tenders.</i>	NUMBER OF COMPLETED STEEL PIPE PROJECTS OF DIAMETER 800MM OR MORE, CONSTRUCTION COST OF R15 MILLION OR MORE	Zero (0) Completed Projects	20	0
				Completed one (1) project		8
				Completed two (2) projects		16
				Completed more than two (2) projects		20



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Clause number	<u>Tender Data</u>						
	CRITERIA NO #	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAX SCORE	SCORE
4		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 / 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.	Tenderer must Provide CV of Safety Officer in the format given on T2.1.9 and certified copies of qualifications and valid registration certificate. All Civil/ Mechanical Engineering projects will be considered <i>Tenderers may provide their own CVs but the information provided should contain all information in T2.1.9</i> <i>Note: The information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting in participating in any future government tenders</i>	NUMBER OF CIVIL / MECHANICAL ENGINEERING PROJECTS COMPLETED AS SAFETY OFFICER	Zero (0) Completed Projects	20	0
					1 - 2 Completed Projects		8
					3 - 4 Completed Projects		16
					More than 4 Completed Projects		20



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	CRITERIA NO #	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE	MAX SCORE	SCORE
5		Site Specific Method Statement	Tenderer must provide a Site Specific Method Statement which addresses the following sections: Method Statement Section 1 - Approach Statement and Introduction (Maximum - 4 Pages) which illustrates an understanding of the scope. This is inclusive of the following major components of section 1: ○ Laying of the steel pipeline, including pipe jacking ○ Construction of air valve chambers ○ Construction of scour valve chamber ○ Construction of a pressure reducing valve building ○ Construction of a metering chamber ○ Construction of a reservoir control valve building	Site Specific Method Statement not submitted	20	0
				Tenderer has partially covered major components of two or less method statement sections		8
				Tenderer has partially covered major components of all the three method statement sections		16
				Tenderer has covered all of the major components of all the three method statement sections		20



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			Method Statement Section 2 - Quality Control Plan (Maximum 4 Pages) including all necessary standards to be used, resources available and procedures to ensure quality. This is inclusive of the following major components of section 2: ○ Laying of the steel pipeline, including pipe jacking ○ Construction of air valve chambers ○ Construction of scour valve chamber ○ Construction of a pressure reducing valve building ○ Construction of a metering chamber ○ Construction of a reservoir control valve building			



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Clause number	<u>Tender Data</u>					
			Method Statement Section 3 - Project Programme/ Schedule Major components of section 3: (On MS Projects or any other Gantt chart) outlining critical path, aligned to the scope of works, aligned to the contractual timelines, and including all contractual dates. This is inclusive of the following major components: ○ Laying of the steel pipeline, including pipe jacking ○ Construction of air valve chambers ○ Construction of scour valve chamber ○ Construction of a pressure reducing valve building ○ Construction of a metering chamber ○ Construction of a reservoir control valve building			
	Minimum Required Score					80
	Maximum Score Allocated					100
	Tenderers who FAIL to meet the minimum required score or requirements of tender will result in disqualification.					



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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. The BEC 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 style="text-align: center;">90</td></tr> <tr> <td>SPECIFIC GOALS</td><td style="text-align: center;">10</td></tr> <tr> <td>Total points for Price and Specific Goals must not exceed</td><td style="text-align: center;">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								



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	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) • Promotion of enterprises located in the City of Johannesburg municipality • Promotion of enterprises located rural or underdeveloped areas or townships.



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	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 Table 1:



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	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
	The following verification documents must be submitted with the tender document:	
	SPECIFIC GOALS – ANY ONE 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 confirming the business address. Businesses that operate from personal properties are required to submit an affidavit	
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 following are the requirements for a valid Sworn Affidavit in terms of the BBBEE Sector Codes of Good Practise:		



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Clause number	Tender Data																																																																																													
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	BO EME	Less than R10m																																																																																												
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.																																																																																														
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.																																																																																														



CONTRACT JW14301R
LINBRO WATER UPGRADE
TENDERING DATA
Volume 1 Tender and Contract
Section T1 Tender and Contract



Clause number	Tender Data
	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;. (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.



CONTRACT JW14301R
LINBRO WATER UPGRADE
TENDERING DATA
Volume 1 Tender and Contract
Section T1 Tender and Contract



Clause number	Tender Data
	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 $Ps = 90 \left(1 - \frac{Pt - P_{\min}}{P_{\min}} \right)$ 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 ie MA xxxxx number; c) the tenderer submits a letter of intent from an approved insurer undertaking to provide the Performance Guarantee to the format included in Part T2.2.22 of this procurement document d) the tenderer is registered with the Construction Industry Development Board in an appropriate contractor grading designation; e) the tenderer or any of its directors/shareholders is not listed on the Register of Tender Defaulters in terms of the Prevention and Combating of Corrupt Activities Act of 2004 as a person prohibited from doing business with the public sector; f) the tenderer has not: i) abused the Employer’s Supply Chain Management System; or ii) failed to perform on any previous contract and has been given a written notice to this effect; g) the tenderer has completed the Compulsory Enterprise Questionnaire and there are no conflicts of interest which may impact on the tenderer’s ability to perform the contract in the best interests of the Employer or potentially compromise the tender process and persons in the employ of the state are permitted to submit tenders or participate in the contract; h) the tenderer is registered and in good standing with the compensation fund or with a licensed compensation insurer;

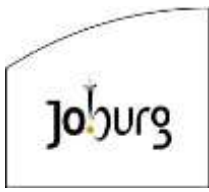


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Clause number	Tender Data
	i) the Employer is reasonably satisfied that the tenderer has in terms of the Construction Regulations, 2014, issued in terms of the Occupational Health and Safety Act, 1993, the necessary competencies and resources to carry 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 --



Johannesburg Water SOC Ltd



LINBRO WATER UPGRADE

VOLUME 1

RETURNABLE DOCUMENTS AND SCHEDULES

Employer:		Contractor:	
Witness:		Witness:	



T2.1 LIST OF RETURNABLE DOCUMENTS

The tenderer must complete the following returnable documents:

<u>Document</u>	<u>Page</u>
1. Returnable Schedules required for tender evaluation purposes	
T2.1.1 Record of addenda to tender documents	RD.4
T2.1.2 Certificate of Authority	RD.5
T2.1.3 Compulsory Enterprise Questionnaire	RD.10
T2.1.4 Preferential Procurement	RD.12
MBD 6.1 Preference points claim form in terms of the preferential procurement regulations	RD.13
MBD 4 Declaration of any potential conflict of interest	RD.21
MBD 8 Declaration of bidder's past Supply Chain management practices	RD.24
MBD 5 Declaration for Procurement above R10 Million (VAT Included)	RD.26
MBD 9 Certificate of independent bid determination	RD.29
T2.1.5 Proposed qualifications	RD.32
T2.1.6 Schedule of the Tenderer's experience	RD.33
T2.1.7 Contactable reference template	RD.34
T2.1.8 Schedule of key personnel	RD.35
T2.1.9 Curriculum vitae of key personnel	RD.36

T2.2 LIST OF RETURNABLE DOCUMENTS

<u>Document</u>	<u>Page</u>
2. Other documents required only for tender evaluation purposes	
T2.2.1 Certificate of Contractor Registration issued by the Construction Industry Development Board	RD.40
T2.2.2 SARS Tax Compliance Status Pin and Proof of CSD registration i.e. MA number	RD.41

T2.3 LIST OF RETURNABLE SCHEDULES

<u>Document</u>	<u>Page</u>
3. Other documents that will be incorporated into the contract	
T2.3.1 JW 6.4 Returnable Annexure A – SHE Acknowledgment Form	RD.43
T2.3.2 JW 6.5 Returnable Annexure B: Acknowledgement of Tender Drawings	RD.44
T2.3.3 Minutes of the Mandatory Tender Briefing Meeting	RD.46

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:	



T2.1 LIST OF RETURNABLE DOCUMENTS

Document

Page

1. Returnable Schedules required for tender evaluation purposes

T2.1.1	Record of addenda to tender documents	RD.4
T2.1.2	Certificate of Authority	RD.5
T2.1.3	Compulsory Enterprise Questionnaire	RD.10
T2.1.4	Preferential Procurement	RD.12
T2.1.5	Proposed qualifications	RD.32
T2.1.6	Schedule of the Tenderer's experience	RD.33
T2.1.7	Contactable reference template	RD.34
T2.1.8	Schedule of key personnel	RD.35
T2.1.9	Curriculum vitae of key personnel	RD.36

Employer:		Contractor:	
Witness:		Witness:	



T2.1.1 RECORD OF ADDENDA TO TENDER DOCUMENTS

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

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

Attach additional pages if more space is required.

Signed

Date

Name

Position

Tenderer

Employer:		Contractor:	
Witness:		Witness:	



T2.1.2 CERTIFICATE OF AUTHORITY

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

(I) COMPANY	(II) CLOSE 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. JW14301R and any contract resulting from it on behalf of the company.

Chairman:

As Witnesses: 1.....

2.....

Date:

Employer:		Contractor:	
Witness:		Witness:	



Contract JW14301R
LINBRO WATER UPGRADE
RETURNABLE DOCUMENTS



(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:	



Contract JW14301R
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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:	



Contract JW14301R
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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:	



T2.1.3 COMPULSORY ENTERPRISE QUESTIONNAIRE

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

Section 1: Name of enterprise:

Section 2: VAT registration number, if any:

Section 3: CIDB registration number, if any:

Section 4: Particulars of sole proprietors and partners in partnerships

Name*	Identity number*	Personal income tax number*

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

Section 5: Particulars of companies and close corporations

Company registration number

Close corporation number

Proof of CSD registration ie MA xxxxxxxxx number.

SARS Tax Compliance status Pin number

Section 6: Record in the service of the state

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

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

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

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

*insert separate page if necessary

Employer:		Contractor:	
Witness:		Witness:	



Contract JW14301R
LINBRO WATER UPGRADE
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Section 7: Record of spouses, children and parents in the service of the state

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

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

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
- iv) 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:	



T2.1.4 PREFERENTIAL PROCUREMENT

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

Form No.	Form Title	Description	Page
MBD 6.1	Empowerment and Preferential Procurement	Procedures and adjudication criteria for the information of the Tenderer	RD.13
MBD 4	Declaration of any potential Conflict of Interest	Form to be completed by the Tenderer	RD.21
MBD 8	Declaration of bidder's past supply chain management practices	Form to be completed by the Tenderer	RD.24
MBD 5	Declaration for Procurement above R10 Million (VAT Included)	Form to be completed by the Tenderer	RD.26
MBD 9	Certificate of Independent Bid Determination	Form to be completed by the Tenderer	RD.29

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:	



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.

Employer:		Contractor:	
Witness:		Witness:	



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

2. DEFINITIONS

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

Employer:		Contractor:	
Witness:		Witness:	



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:

90/10

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

Where

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

4. 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:

90/10

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

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:	



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.

Employer:		Contractor:	
Witness:		Witness:	



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

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	☐

Employer:		Contractor:	
Witness:		Witness:	



- 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		

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:	



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:	



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:.....
.....

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:	



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:	



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:	



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.

.....
.....

Employer:		Contractor:	
Witness:		Witness:	



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- 3 Has any contract been awarded to you by an organ of state during the past five years, including particulars of any material non-compliance or dispute concerning the execution of such contract?

YES / NO

3.1 If yes, furnish particulars

.....
.....

- 4 Will any portion of goods or services be sourced from outside the Republic, and, if so, what portion and whether any portion of payment from the municipality / municipal entity is expected to be transferred out of the Republic?

YES / NO

4.1 If yes, furnish particulars

.....
.....

Employer:		Contractor:	
Witness:		Witness:	



CERTIFICATION

I, THE UNDERSIGNED (NAME)

.....

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

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

FALSE.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

Employer:		Contractor:	
Witness:		Witness:	



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:	



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;

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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- (e) the submission of a bid which does not meet the specifications and conditions of the bid; or
(f) bidding with the intention not to win the bid.
8. In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the products or services to which this bid invitation relates.
9. The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.
10. I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No. 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No. 12 of 2004 or any other applicable legislation.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

Employer:		Contractor:	
Witness:		Witness:	



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:	



T2.1.7 CONTACTABLE REFERENCE TEMPLATE

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. **JW14301R** for **Linbro Water Upgrade**

Name of Tenderer:

Name of Project:

Description of Services Provided

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

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.

Employer:		Contractor:	
Witness:		Witness:	



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
Site Agent, Contracts Manager						
Foremen, Quality Control and Safety Personnel						
Technicians, Surveyors, etc.						
Artisans and other Skilled workers						
Plant Operators						
Unskilled Workers						
Others:						

SIGNATURE:.....

DATE:

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

Employer:		Contractor:	
Witness:		Witness:	



T2.1.9 CURRICULUM VITAE OF KEY PERSONNEL

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

Proposed role in the project	

1. Surname	
2. First Name	

3. Education (Submit certified copies of qualifications)

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

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

Institution/ Professional Body	Category of Registration	Registration Number

5. Post Qualification Experience

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

Employer:		Contractor:	
Witness:		Witness:	



6. Project-based Experience

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

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

Employer:		Contractor:	
Witness:		Witness:	



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

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

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

<u>Document</u>	<u>Page</u>
2. Other documents required only for tender evaluation purposes	
T2.2.1 Certificate of Contractor Registration issued by the Construction Industry Development Board	RD.40
T2.2.2 SARS Tax Compliance Status Pin and Proof of CSD registration i.e. MA xxxxxxxxxxxx number	RD.41

Employer:		Contractor:	
Witness:		Witness:	



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.

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

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

SIGNATURE:.....

DATE:

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

Employer:		Contractor:	
Witness:		Witness:	



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:.....

DATE:

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

Employer:		Contractor:	
Witness:		Witness:	



T2.3 LIST OF RETURNABLE SCHEDULES

<u>Document</u>	<u>Page</u>
3. Other documents that will be incorporated into the contract	
T2.3.1 JW 6.4 Returnable Annexure A – SHE Acknowledgment Form	RD.43
T2.3.2 JW 6.5 Returnable Annexure B: Acknowledgement of Tender Drawings	RD.44
T2.3.3 Minutes of the Mandatory Tender Briefing Meeting	RD.46

Employer:		Contractor:	
Witness:		Witness:	



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:	



T2.3.2 Returnable Annexure B: Acknowledgement of Tender Drawings

DECLARATION BY CONTRACTOR

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

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

DRAWING NUMBER	DESCRIPTION
JW14301R-DET01-W01	LIST OF DRAWINGS
JW14301R-DET02-W01	LOCALITY PLAN
JW14301R-DET03-W01	LAYOUT PLAN
JW14301R-DET04-W01	LPARC LAYOUT PLAN
JW14301R-DET05-W01	GUARD HOUSE
JW14301R-DET06-W01	TYPICAL THRUST BLOCKS DETAILS
JW14301R-DET07-W01	ROAD CROSSING BY PIPE JACKING: SECTION 1 SCHEDULE
JW14301R-DET08-W01	STEEL PIPE TAPERS AND BENDS
JW14301R-DET09-W01	STEEL PIPE PROTECTIVE COATING, PIPE JOINTING FOR PLAIN AND BELL ENDED
JW14301R-DET10-W01	STANDARD DETAILS FOR TRENCH EXCAVATION AND BACKFILL FOR STEEL PIPES > 400mm ND
JW14301R-DET11-W01	AIR VALVE CHAMBER ON 1100mm ND PIPE
JW14301R-DET12-W01	AIR VALVE CHAMBER PADLOCK PIN DETAILS
JW14301R-DET13-W01	TYPICAL SCOUR VALVE CHAMBER FOR PIPES > 400mm ND
JW14301R-DET14-W01	AIR VALVE CHAMBER ON 1000mm ND PIPE
JW14301R-DET15-W01	ISOLATION VALVE CHAMBER AND INCLUDING OFF TAKE
JW14301R-DET16-W01	ISOLATION VALVE CHAMBER COVER SLAB
JW14301R-DET17-W01	PRESSURE REDUCING AND RESERVOIR CONTROL VALVE CONFIGURATION
JW14301R-DET18-W01	PRESSURE REDUCING AND FLOW METER PIPE SCHEDULE
JW14301R-DET19-W01	RESERVOIR CONTROL VALVE PIPE SCHEDULE
JW14301R-DET20-W01	RES 1 RESERVOIR INLET ARRANGEMENTS
JW14301R-DET21-W01	RES 2 RESERVOIR INLET ARRANGEMENTS
JW14301R-DET22-W01	NODE AND JUNCTION DETAILS
JW14301R-DET23-W01	PIPE MARKERS
JW14301R-DET24-W01	NAME BOARD
JW14301R-DET25-W01	LONG SECTION SECTION 1
JW14301R-DET26-W01	LONG SECTION SECTION 2 TO SECTION 4b
JW14301R-DET27-W01	STEEL STAIRCASE LAYOUT
JW14301R-DET28-W01	NAME BOARD HOLDER
JW14301R-DET29-W01	TYPICAL INSULATION KIT
JW14301R-DET30-W01	REINFORCEMENT DETAILS - TYPICAL SCOUR VALVE CHAMBER FOR PIPE >400 ND
JW14301R-DET30A-W01	REINFORCEMENT DETAILS - TYPICAL SCOUR VALVE CHAMBER FOR PIPE >400 ND
JW14301R-DET31-W01	REINFORCEMENT DETAILS - ISOLATION VALVE CHAMBER
JW14301R-DET31A-W01	REINFORCEMENT DETAILS - ISOLATION VALVE CHAMBER - BENDING SCHEDULE
JW14301R-DET32-W01	REINFORCEMENT DETAILS - PRESSURE REDUCING BUILDING

Employer:		Contractor:	
Witness:		Witness:	



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DRAWING NUMBER	DESCRIPTION
JW14301R-DET32A-W01	REINFORCEMENT DETAILS - PRESSURE REDUCING BUILDING - BENDING
JW14301R-DET33-W01	REINFORCEMENT DETAILS - PRESSURE REDUCING BUILDING
JW14301R-DET33A-W01	REINFORCEMENT DETAILS - PRESSURE REDUCING BUILDING – BENDING JOINTS AND MAKING GOOD OF JOINTS SCHEDULE
JW14301R-DET34-W01	REINFORCEMENT DETAILS - FLOW METER CHAMBER
JW14301R-DET34A-W01	REINFORCEMENT DETAILS - FLOW METER CHAMBER - BENDING SCHEDULE
JW14301R-DET35-W01	REINFORCEMENT DETAILS - RESERVOIR CONTROL VALVE BUILDING
JW14301R-DET35A-W01	REINFORCEMENT DETAILS - RESERVOIR CONTROL VALVE BUILDING - BENDING SCHEDULE
JW14301R-DET36-W01	REINFORCEMENT DETAILS - RESERVOIR CONTROL VALVE BUILDING
JW14301R-DET36A-W01	REINFORCEMENT DETAILS - RESERVOIR CONTROL VALVE BUILDING

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

Minutes of the Mandatory Tender Briefing Meeting

Employer:		Contractor:	
Witness:		Witness:	



Johannesburg Water (SOC) Ltd



CONTRACT JW14301R

LINBRO WATER UPGRADE

VOLUME 1

PART 1: AGREEMENT AND CONTRACT DATA

Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14301R
LINBRO WATER UPGRADE
Volume 1 Tender and Contract
Section C1 Agreement and Contract Data



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C1.3	FORMS AND SECURITIES	C.28

Employer:		Contractor:	
Witness:		Witness:	



C1.1 FORM OF OFFER (ACCEPTANCE & AGREEMENT)

C1.1.1 Form of Offer

The Contractor is to complete and sign the Form of Offer

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

JW 14301R: Linbro Water Upgrade

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:	



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 Contact Data) to arrange the delivery of any bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the Conditions of Contract identified in the Contract Data at, or just after, the date of this Agreement comes into effect. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this Agreement.

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

Name and signature
of witness

(Name) _____ (Signature) _____

Date _____

Employer:		Contractor:	
Witness:		Witness:	



C1.1.3 Schedule of Deviations

Notes:

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

1 Subject

Details

2 Subject

Details

3 Subject

Details

4 Subject

Details

5 Subject

Details

6 Subject

Details

7 Subject

Details

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.

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Witness:		Witness:	



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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:	



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GCC Clause	Information
	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 17% of the Contract Price shall be subcontracted to SMME's. Where the identified items for subcontracting do not form 17% 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	Delete Clause 4.10.1 and replace with the following: The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all employees (excluding local labourers) and for their payment, housing, feeding and transport (provided that any use of any part of the Site for said purposes shall be subject to the prior approval of the Employer's Agent) and the Contractor indemnifies the Employer against any liability arising out of the Contractor's said arrangements, whether such arrangements involve the use of the Site or not. The Contractor shall employ a minimum of 15 general labourers 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 Manager • Safety Officer The minimum requirements in terms of qualifications and experience of these Key Personnel are listed in C1.2.1.2.15 (see below).
5.3.1	The documentation required before commencement with Works execution are: • Approved Health and Safety File (Clause 4.3) • Approval of the Environmental File (Clause 4.3) • Initial programme & cashflow projections (Clause 5.6) • Guarantee from Bank or Insurance Company (Clause 6.2) • Insurance of the Works, Plant, etc. (Clause 8.6), including but not limited to: ○ SASRIA Policy ○ Liability Insurance ○ Insurance of Construction Machinery and Plant ○ Insurance of Motor Vehicle Liability, etc. • Compliance Certificate in respect of COID • Signed Notification to the Department of Labour • Construction Permit (where applicable). The Employer will require Health and Safety documentation from the Contractor to acquire this permit.
Employer:	Contractor:
Witness:	Witness:

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GCC Clause	Information
	- Organogram of resources - Subcontract plan/ proposal which includes a number of Subcontractors that meet requirements as per conditions of C1.2.1.2.14
5.3.2	The time to submit 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.
5.8.1	Working days shall be Monday to Friday, between 07h00 to 17h00.
5.8.1	The non-working days are 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.
5.13.1	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 R10,000.00 per day, whichever is greater.
5.14.1	The requirements for achieving Practical Completion are: - Construction, testing & commissioning of all pipework. - All building works to be connected to water and sewer and have electrical installation with a certificate of compliance. - Installation, testing & commissioning of all valves. - Installation, testing & commissioning of all electrical and C&I infrastructure. - Reinstatements of man-made surfaces, including road surfaces. - Environmental rehabilitation of site.
5.16.3	The latent defects period is 10 years.
6.2.1	The time to deliver the Form of Guarantee is within 28 days from the Commencement Date.
6.8.2	The Contract Price Adjustment is applicable for this contract. The contract rates shall be fixed for the first 12 months and thereafter the rates will be adjusted by the change in CPA (as published by Statistics SA and will be fixed for the next 12 months) The following formula will be applicable. $(1-x) \left[\frac{aL_t}{L_o} + \frac{bP_t}{P_o} + \frac{cM_t}{M_o} + \frac{dF_t}{F_o} - 1 \right]$ In which the symbols have the following meaning as per GCC 2015: "x" is the proportion of "Ac" which is not subject to adjustment. "a", "b", "c" and "d" are the coefficients contained in the Contract Data, which are deemed, irrespective of the actual constituents of the work, to represent the

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GCC Clause	Information
	proportionate value of labour, contractors' equipment, material (other than "special materials" specified in the Contract Data) and fuel respectively. "L" is the "Labour Index" "P" is the "Plant Index" "M" is the "Materials Index" "F" is the "Fuel Index" The suffix "o" denotes the base indices applicable to the base month as stated in the Contract Data. The suffix "t" denotes the current indices applicable to the month in which the last day of the period falls to which the relevant monthly statement relates. If any index relevant to any particular certificate is not known at the time when the certificate is prepared, the Engineer shall estimate the value of such index. Any correction which may be necessary when the correct indices become known, shall be made by the Engineer in subsequent payment certificates. The value of the payment certificates issued shall be adjusted in accordance with the Contract Price Adjustment Schedule, with the following values: The value of "x" is 0,10 The values of the coefficients are: a = 0,32 Labour b = 0,25 Contractor's equipment c = 0,33 Material d = 0,10 Fuel The province where the Site is located is Gauteng and the urban area where the project is implemented is Johannesburg. The Consumer Price Indices for Labour (L), Plant (P), Material (M) and Fuel (F) are as published by Statistics South Africa for the applicable time. The base month is one month before the tender closing date.
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%.
6.10.3	The maximum percentage retention on the amounts due to the Contractor is 10% of the Contract Sum.

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GCC Clause	Information
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 30 days of receipt of the Contractor's statement. Payment shall be subject to the Contractor submitting an Original Tax Invoice compliant with SARS requirements for a Valid Tax Invoice to the Employer for the amount due. Any dissatisfaction in respect of such payment certificate shall be dealt with in terms of Clause 10.2.
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'.
8.4.1.1	Add to the end of Clause 8.4.1.1 the following text: "hereby indemnifies the Employer against any liability in respect of damage or physical loss of property of any person or injury or death of any person due to non-compliance with the Occupational Health and Safety Act (Act 85 of 1993).
8.6.1.1.2	The value of plant and materials supplied by the Employer to be included in the insurance sum is R0.
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.
8.6.1.3	The limit of indemnity for liability insurance is R20,000,000 (Twenty million Rand) for any single claim – the number of claims to be unlimited during the Construction and Defects Liability Periods
8.6.1.5	In addition to the insurances required in terms of General Conditions of Contract Clauses 8.6.1.1 to 8.6.1.4 the following insurance is also required: a. The Contractor shall insure all Construction Machinery and Plant (including tools, offices and other temporary structures and content) and other items, other than those intended for incorporation into the works, owned, leased or hired and brought on to the Site against all risks of physical loss or damage

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GCC Clause	Information
	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 effected 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. b. The Contractor and the Sub-contractors shall effect and maintain at their cost, insurance under the provision of the Compensation for Occupational Injuries and Diseases Act (COID), 1993 (Act No. 130 of 1993) c. The Contractor and the Sub-Contractors shall effect and maintain at their own cost, motor vehicle liability insurance with at least indemnification for "balance of third party" risks, including passenger liability with a limit of indemnity of not less than R2,5 million. d. Where the contract involves manufacturing and/or fabrication of the works or part thereof at premises other than the Site, the Contractor shall satisfy the Employer that all materials and equipment for incorporation in the works are adequately insured during manufacture and/or fabrication. In the event of the Employer having an insurable interest in such works during manufacture or fabrication then such interest shall be noted by endorsement to the Contractor's Policies of Insurance. e. Any other Insurance cover that may be deemed necessary by the Contractor to ensure full and successful completion of the Works.
10.4.2	Dispute resolution shall be by Amicable Settlement, failing which, any dispute shall be resolved by way of ad-hoc Adjudication.
10.5.3	The number of Adjudication Board Members to be appointed is one (1).
10.7.1	The determination of disputes shall be by arbitration.

Employer:		Contractor:	
Witness:		Witness:	



C1.2.1.2 Additions

The additional Conditions of Contract are:

C1.2.1.2.1 Penalties

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

a) Fail to report

- The Employer shall levy a penalty on Contractor, should the latter fail to provide reporting as required in C1.2.1.2.6, C1.2.1.2.14 and the specification highlighted in the Scope of Work, 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.

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

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- 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

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. behavioural based safety inspection) assessments and other requirements, as necessary.

Each Contractor is required to maintain a minimum compliance rating of 93% (Ninety Three Percent).

The Employer may impose a penalty value of R20,000.00 per audit report.

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.

Each Contractor is required to maintain a minimum compliance rating of 93% (Ninety Three Percent). The Employer may impose a penalty value of R20,000.00 per audit report.

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Witness:		Witness:	



f) Penalties payable

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

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.

C1.2.1.2.4 Prevention of corruption

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

C1.2.1.2.5 Confidential nature of documents

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

Employer:		Contractor:	
Witness:		Witness:	



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

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

Employer:		Contractor:	
Witness:		Witness:	



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

C1.2.1.2.8 Examination of the work before covering up

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

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

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

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

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

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

C1.2.1.2.11 Date falling on public holiday or weekend

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

Employer:		Contractor:	
Witness:		Witness:	



C1.2.1.2.12 Ambiguities and inconsistencies

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

C1.2.1.2.13 False claims by the Contractor

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

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

C1.2.1.2.14 Special Conditions

The successful Contractor must subcontract a minimum of 17% 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. Provision was made for subcontracting in the Bill of Quantities. Subcontracting activities are indicated in the Bill of Quantities. Where the provision for subcontracting is less than the minimum subcontracting requirement, the Contractor will identify additional subcontracting items or tasks that will meet the subcontracting minimum of 17% of the value of this Contract.

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Witness:		Witness:	



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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.
- Where the identified items for subcontracting do not form 17% of the Contract Price, the Contractor shall identify additional works that will be subcontracted to ensure compliance with the minimum subcontracting percentage
- 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 17% 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. 17% 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

Employer:		Contractor:	
Witness:		Witness:	



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- 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)
- 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/proviso's:
 - Invoices that are due for payment from suppliers and the like must be invoices that have been approved for payment, and be based on work or services that have actually been completed or delivered. Payments that are due to labour will be based on approved timesheets.
 - The Contractor is to ensure that any invoice presented for payment is indeed an approved invoice, and that the necessary work or services have been delivered or completed. The approved invoice shall be settled (paid) by the Contractor (on behalf of the Subcontractor) by the due date for payment.
 - The Contractor will be entitled to deduct payments made to any third party, on behalf of the Subcontractor, from subsequent payments that may become due to the Subcontractor.
 - The Contractor will be entitled to bill the Subcontractor a mark-up on the payments made on behalf of the sub-contractor. The mark-up shall not be more than 10% (ten percent) of the amount actually paid (i.e. the amount (excluding VAT) reflected on the invoice that has been settled). The mark-up amount shall be deducted from subsequent payments that may become due to the Subcontractor.
 - 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.

Employer:		Contractor:	
Witness:		Witness:	



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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 *domicilium* and registered address of business, as well as ongoing status of compliance with all applicable legal requirements.
 - Name of Subcontractor and BBBEE status
 - Area and location of project
 - Scope of work issued to the Subcontractor
 - Value of the work issued (this information must be submitted in a format that is readily auditable)
 - Monthly payments made to the subcontractor (this information must be submitted in a format that is readily auditable)
 - Assistance provided to the Subcontractor e.g. advance payments, acquisition of materials, machinery, tools, etc.
 - Performance of the Subcontractor, with evidence to support this performance assessment.
5. Upon completion of the project, the Contractor is required to provide a final report to JW on skills transferred to / acquired by the Subcontractor(s) engaged on the Project, description and value of work performed, as well as their overall performance.
6. The Contractor shall also indicate whether the experience gained by the Subcontractor is sufficient to assist the Subcontractor to improve their CIDB grading, with full details of supporting information.

Employer:		Contractor:	
Witness:		Witness:	

C1.2.1.2.15 Competent Employees

Competent Employees	Qualifications	Experience
Contracts Manager	Minimum Qualifications of Contract Manager Only Contract Managers with qualifications of BTech/ BSc/ BEng: Engineering (Civil/ Mechanical) or higher AND ECSA Professional Registration (Pr. Eng. / Pr. Technologist) 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	Minimum of five (5) completed Pipe Laying Projects of a Minimum Diameter of 800mm (Per Project) Completed As Contract Manager
Site Manager	Minimum Qualifications of Site Manager Only Site Managers with qualifications of National Diploma (Civil/ Mechanical) Engineering or higher AND Registered as a Candidate Engineering Professional with the ECSA or higher will be considered	Minimum of three (3) completed Pipe Laying Projects of Welded Steel Pipe With a Minimum Diameter of 800mm (Per Project) Completed As Site Manager
Safety Officer	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 / 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	Minimum of three (3) completed civil/ mechanical engineering projects as safety officer

C1.2.1.2.16 Tie-in Limitations

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

Employer:		Contractor:	
Witness:		Witness:	

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 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

Employer:		Contractor:	
Witness:		Witness:	



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	“Such steps shall be approved by the Employer's Agent, which approval shall not be unreasonably withheld.” WITH “Such steps shall be subject to the approval of the Employer's Agent, which approval shall not be unreasonably withheld.”
6.5.1.3	Basis of payment for dayworks ON PAGE 40, IN THE LAST LINE OF THE SUB-CLAUSE, REPLACE THE PHRASE “ruling plant hire rates” WITH “ruling construction equipment hire rates”

Employer:		Contractor:	
Witness:		Witness:	



C1.2.2 Part 2: Data Provided by the Contractor

GCC Clause	Information						
Clause 1.1.9	The name of the Contractor is..... The Contact person is.....						
Clause 1.2.1.2	The address of the Contractor is: Physical Address: _____ Postal Address: _____ _____ _____ _____ Tel: _____ Fax: _____ _____ Email: _____ _____						
Clause 1.1.1.1 4	The time for achieving Practical Completion is 09 months from the Commencement Date						
Clause 6.2.1	The security to be provided by the Contractor shall be one of the following: Fixed Performance Guarantee of 10% of the Contract Sum (which sum shall exclude VAT)						
Clause 6.8.3	The variation in cost of special materials is <table border="0"> <thead> <tr> <th>Type</th> <th>Unit</th> <th>Rate</th> </tr> </thead> <tbody> <tr> <td colspan="3" style="text-align: center;">NOT APPLICABLE</td> </tr> </tbody> </table>	Type	Unit	Rate	NOT APPLICABLE		
Type	Unit	Rate					
NOT APPLICABLE							

Employer:		Contractor:	
Witness:		Witness:	

Johannesburg Water (SOC) Ltd



CONTRACT NO. JW14301R

LINBRO WATER UPGRADE

VOLUME 1

PART 1.3: FORMS AND SECURITIES

Employer:		Contractor:	
Witness:		Witness:	



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Employer:		Contractor:	
Witness:		Witness:	



C1.3 FORMS AND SECURITIES

FORMS FOR COMPLETION BY THE CONTRACTOR

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

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

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

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

Employer:		Contractor:	
Witness:		Witness:	



C1.3.1 Form of Guarantee

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

WHEREAS Johannesburg Water (SOC) Ltd (hereinafter referred to as “the Employer” or “beneficiary”) entered into a Contract with

(hereinafter called “the Contractor”)

on the _____ day of _____ 20____ for

(Project Description)

at _____

AND WHEREAS it is provided by such Contract that the Contractor shall provide the Employer with security by way of a guarantee for the due and faithful fulfilment of such Contract by the Contractor;

AND WHEREAS

has/have at the request of the Contractor, agreed to such guarantee;

NOW THEREFORE WE,

Do hereby guarantee and bind ourselves jointly and severally as Guarantor and Co-principal Debtors to the Employer under renunciation of the benefits of division and exclusion for the due and faithful performance by the Contractor of all the terms and conditions of the said Contract, subject to the following conditions:

1. The Employer shall, without reference and/or notice to us, have complete liberty of action to act in any manner authorised and/or contemplated by the terms of the said Contract, and/or to agree to any modifications, variations, alterations, directions or extensions of the Completion Date of the Works under the said Contract, and that its rights under this guarantee shall in no way be prejudiced nor our liability hereunder be affected by reason of any steps which the Employer may take under such Contract, or of any modification, variation, alteration of the Completion Date which the Employer may make, give, concede or agree to under the said Contract
2. This guarantee shall be limited to the payment of a sum of money.
3. The Employer shall be entitled, without reference to us, to release any guarantee held by it, and to give time to or compound or make any other arrangement with the Contractor.

Employer:		Contractor:	
Witness:		Witness:	



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4. This guarantee shall remain in force and effect **until the issue of the Certificate of Completion in terms of the Contract**, unless we are advised in writing by the Employer before the issue of the said Certificate of his intention to institute claims, and the particulars thereof, in which event this guarantee shall remain in full force and effect until all such claims have been paid or liquidated
5. Our total liability hereunder shall not exceed the sum of _____

_____(R_____)
6. The guarantor reserves the right to withdraw from this guarantee by depositing the Guaranteed Sum with the beneficiary, whereupon the Guarantor's liability hereunder shall cease.
7. We hereby choose our address for the serving of all notices for all purposes arising here from as

IN WITNESS WHEREOF this guarantee has been executed by us at _____
on the _____ day of _____ 20_____

As witnesses

1. _____ Signature _____
2. _____ Signature _____

Duly authorised to sign on behalf of: _____

Address: _____

Employer:		Contractor:	
Witness:		Witness:	



C1.3.2 Blasting Indemnity

Given by

*Company Registration No. _____

Address

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

in his capacity as the Contractor's _____ duly

authorised hereto by a resolution of the Contractor dated _____

a certified copy of which resolution is attached to this Indemnity.

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

_____ and the Company requires this Indemnity from the Contractor

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

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:	



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As witnesses

1. _____
Name & Surname Signature

2. _____
Name & Surname Signature

Duly authorised to
sign on behalf of _____

Address _____

Employer:		Contractor:	
Witness:		Witness:	



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

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

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

Signed this _____ day of _____ at _____

Signature on behalf of mandatory _____

Signature on behalf of Employer _____

Compensation Fund Registration No. of mandatory _____

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

Employer:		Contractor:	
Witness:		Witness:	



C1.3.4 Health and Safety Contract: General Information

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

10. The work to be done is **JW14301R: LINBRO WATER UPGRADE**

11. The area in which the work is to be conducted is **LINBRO PARK, JOHANNESBURG**

12. The Contractor shall familiarise himself with such area and all risks existing thereon and undertakes to report to the representative of the Employer any hazard or risk to health and safety which arises during the contract work in the area concerned and over which the Contractor may have no control. All necessary and appropriate safety / health equipment shall be issued by the Contractor to all persons working on or coming into the area.

Employer:		Contractor:	
Witness:		Witness:	



C1.3.4.1 Occupational Health and Safety Indemnity Undertaking

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

1. Hereby undertake to ensure that I/my firm and/or employees and/or subcontractors and/or his employees -
 - 1.1 comply strictly with the provisions of the Occupational Health and Safety Act of 1993 (as amended) and/or the regulations promulgated in terms thereof, with specific reference to section 37(2) of the said act, as well as any relevant legislation, in the course of the performance/execution of any service and/or work in, to or on any of the Employer's buildings, construction sites and/or premises;
 - 1.2 ensure that consultants and/or visitors comply with any instructions and measures relating to occupational health and safety, as prescribed by the Employer; and
 - 1.3 comply strictly with the statutorily prescribed work systems, operational equipment, machinery and occupational health and safety conditions;
2. And as an independent employer and contractor, hereby indemnify, in terms of the above undertakings, the Employer -
 - 2.1 in respect of any costs that I/my firm and/or employees and/or subcontractors and their employees may incur of necessity in compliance with the above undertakings; and
 - 2.2 against any claims that may be instituted against the Employer and/or any liability that the Employer may incur, whether instituted and/or caused by me/my firm's employees, agents, consultants, subcontractors and/or their employees and visitors or the Employer's clients or neighbours in respect of any incidents related to my/my firm's activities and as a result of which the occupational health and safety of the persons involved have been detrimentally affected; and
 - 2.3 against similar claims that I, managers or directors of my firm may have against the Employer and any damages for which I, managers or directors of my firm hold the Employer liable.
3. My firm's compensation commissioner number is _____
and I confirm that my firm and its subcontractors' fees have been paid up and obligations in respect of the compensation commissioner have been complied with and further that I shall furnish proof thereof in writing on request.
- 4 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 _____

As witnesses:

1 _____
2 _____

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3	4		
Part	T1	T2	C1	C2	C3	C4



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Linbro Water Upgrade

Part 2: Pricing Data

Johannesburg Water SOC Ltd



LINBRO WATER UPGRADE

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Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3	4		
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Part 2: Pricing Data

C2 PRICING DATA

c2.1 PRICING INSTRUCTIONS

C2.1.1 GENERAL PREAMBLE TO THE BILL OF QUANTITIES (CIVIL 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 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.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3	4		
Part	T1	T2	C1	C2	C3	C4



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

mm	=	millimetre	h	=	hour
m	=	metre	kg	=	kilogram
km	=	kilometre	t	=	ton (1000kg)
m ²	=	square metre	No.	=	number
m ² pass	=	square metre pass	sum	=	lump sum
ha	=	hectare	MN	=	mega-newton
m ³	=	cubic metre	MN.m	=	mega-newton-metre
m ³ km	=	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 dictates of 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.
- m) The Bill of Quantities shall be completed by hand in **INK** or **TYPED**.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3	4		
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Part 2: Pricing Data

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.

C2.1.3.2 Provided previously

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

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

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

C2.1.3.3 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.

C2.1.3.4 Materials and equipment

C2.1.3.4.1 Materials

The Employer shall not provide any materials, as this shall be provided by the Contractor and deemed to have been included in the various provided rates and prices.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3	4		
Part	T1	T2	C1	C2	C3	C4



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Part 2: Pricing Data

C2.1.3.4.2 Equipment

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

C2.1.3.4.3 Damage to materials provided by the Employer

Where the Contractor or public damage any materials, provided by the Employer, whilst in the care of the Contractor, he shall immediately report such damage, arrange for the replacement and all replacement costs shall be at his expense.

C2.1.3.5 Permits and way-leaves

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

C2.1.3.6 Locating existing services

The cost to locate existing services shall be included in the various works activity pricing rates and/or prices, including any excavations required and the provision and use of service detection personnel and equipment. Identified existing services shall be suitably marked at regular intervals for reference purposes.

C2.1.3.7 Confined space

The Contractor shall note that a portion of the work will be executed within confined spaces and it shall be deemed that allowance has been made in all provided activity pricing rates and/or prices.

C2.1.3.8 Concrete

Descriptions (prices) of concrete work shall be deemed to include the design of concrete mixes and all testing of concrete and materials other than compressive strength testing of concrete samples from concrete being placed in the works (the Contractor shall only be entitled to payment for those samples and compressive strength tests called for by the Employer's Agent or his duly authorized representative and which pass the test requirements), handling and depositing (by hoisting or lowering) concrete in the forms, working and packing concrete around reinforcement, all "construction joints" other than "designated joints" as defined in SANS 1200G which are given separately, shaping tops of components as required and striking off and curing.

Descriptions (prices) of concrete in surface beds cast in panels shall be deemed to include formwork, fillets and the like in forming the panels.

C2.1.3.9 Formwork

Formwork is measured to the net surfaces of concrete to be supported, except at intersections of beams with beams, columns, walls, etc. and tops of columns with slabs, beams, etc. where no deductions have been made and descriptions (prices) shall be deemed to include use and waste, except where the formwork is of a permanent nature or is to be left in, fitting together to all required shapes, all cutting, intersections, cambering where required, holes for rods, bolts, pipes and the like, propping, maintaining, keeping damp whilst the concrete is being deposited and removing of formwork.

Formwork "left in" and permanent formwork shall be deemed to include leaving in formwork, props, etc.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3	4		
Part	T1	T2	C1	C2	C3	C4



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Part 2: Pricing Data

Descriptions (prices) of formwork to soffits shall be deemed to include propping not exceeding 3.5m high unless otherwise described. Descriptions (prices) of formwork to walls and columns shall be deemed to be not exceeding 3.5m high above bearing level unless otherwise described.

Descriptions (prices) of formwork to soffits of solid slabs shall be deemed to be to slabs not exceeding 300mm thick unless otherwise described.

C2.1.3.10 Smooth formwork

Descriptions (prices) shall be deemed to include for rubbing off all projections at seams etc. after removal of the formwork, making good any defects with 2:1 cement mortar and leaving a smooth surface with all arises slightly rounded, all to the satisfaction of the Employer's Agent or his duly authorized representative.

C2.1.3.11 Reinforcement

Descriptions (prices) for all steel reinforcement to concrete shall be deemed to include cutting and waste, bending, hooked ends, binding at lappings and intersections with annealed wire, all as above described, hoisting or lowering and maintaining in position whilst the concrete is being deposited and cover blocks and spacers in accordance with the relevant SANS Codes of Practice.

C2.1.3.12 Precast concrete

Descriptions (prices) of precast concrete shall be deemed to include reinforcement required for manufacturing, handling and erection purposes, steel rod or wire loop hooks and/or mortices for Lewis bolts required for handling and transporting, any necessary temporary propping and strutting, bedding, jointing and pointing.

C2.1.3.13 Testing

The cost of testing of the ordered Works shall be included in the various applicable Works items. In particular those:

- clearly intended by or provided for in the specifications.
- involving testing or tests to ensure that the design of the whole of the Works or any part of the Works is appropriate for the purpose which it was intended to fulfil.

No additional or separate payment for testing shall be entertained by the Employer.

C2.1.3.14 Cost of samples

All samples shall be supplied by the Contractor at his own cost unless the supply thereof is clearly intended in the specifications or Bill of Quantities to be at the cost of the Employer. Payment shall not be made for samples which do not comply with the specifications.

C2.1.3.15 Failure to submit reports and associated visual media

The Contractor's payment certificate shall be accompanied by confirmation from the Employer's Agent or his duly authorised representative then at items listed for payment have been successfully executed and/or delivered as required. Failure to obtain such confirmation from the Employer's Agent or his duly authorised representative shall result in non-payment of the Contractor's payment certificate until the default has been corrected or the deemed incomplete items are excluded from the payment certificate.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3	4		
Part	T1	T2	C1	C2	C3	C4



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Linbro Water Upgrade

Part 2: Pricing Data

C2.1.3.16 Payment ONLY for works completed

The Contractor shall note that payment shall only be made for Work activities successfully (delivering the end result) executed, complying with the quality requirements and provided to the Employer's Agent or his duly authorized representative.

C2.1.3.17 Training

The Contractor is required to provide training on all equipment installed during the installation and commissioning periods of the contract. Pricing shall make adequate provision for the training of the Employer's delegated staff members.

C2.1.3.18 Maintenance

Pricing shall include for attendance to maintenance items in accordance with the requirements of the contract conditions and specifications.

C2.1.3.19 Disposal of existing equipment

Pricing shall provide allowance for the successful disposal of all redundant and obsolete equipment indicated for removal from the facility.

C2.1.3.20 Certificate of Compliance

Pricing shall provide allowance for the issuing of the relevant Certificates of Compliance for the installation(s) at the facility. One certificate of compliance is required per electrical distribution board completed, and the certificate shall cover all downstream works.

C2.1.4 SMME Portion of the Works

A particular portion of the works has been allocated for completion by an appointed SMME, as per the Scope of Works. These items are marked with "SC" and the "Amount" Column has been crossed out. These items must not be priced by the Contractor. An indicative provisional sum for all the SC-marked items has been allowed for in the Preliminary and General items.

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 marked with SC in the Bill of Quantities. The Main Contractor will be expected to conduct a competitive process to recommend a Sub-Contractor or Sub-Contractors to Johannesburg Water. Johannesburg Water will then evaluate all rates provided by the Sub-Contractor for fairness. Johannesburg Water will then either a) approve the appointment of the Sub-Contractor or Sub-Contractors or b) enter into negotiations with the Main Contractor and sub-contractor / s or c) request that the Contractor recommend a different sub-contractor.

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

- The Contractor shall ensure that the Subcontractor(s) complies with the 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

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3	4		
Part	T1	T2	C1	C2	C3	C4



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Part 2: Pricing Data

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:	

Volume	1	2	3	4		
Part	T1	T2	C1	C2	C3	C4



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Part 2: Pricing Data

BILL OF QUANTITIES

Employer:		Contractor:	
Witness:		Witness:	

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Linbro Park Water Upgrade

SECTION 1: PRELIMINARY AND GENERAL

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	SANS 1200A		SECTION 1: PRELIMINARY AND GENERAL				
1.1	8.3		FIXED-CHARGE ITEMS				
1.1.1	8.3.1		Contractual Requirements	Sum	1		
	8.3.2		Establishment of facilities on Site for the duration of construction				
	1200AB		Facilities for Engineer (refer to PSAB)				
1.1.2	1200AB 8.2.1		a) Office Building (1 No.) (20m²) (PSAB 3.2.1)	Sum	1		
1.1.3	1200AB 8.2.1		b) Telephone (and computer equipment) (PSAB 4.1)	Sum	1		
1.1.4	1200AB 8.2.1		c) Nameboard (2 No.) (PSAB 3.1)	Sum	1		
1.1.5	1200AB 8.2.1		d) Car Port - single (PSAB 3.3)	Sum	1		
	8.3.2.2		Facilities for Contractor				
1.1.6			a) Offices and storage sheds	Sum	1		
1.1.7			b) Workshops	Sum	1		
1.1.8			c) Laboratories	Sum	1		
1.1.9			d) Living accommodation	Sum	1		
1.1.10			e) Ablution and latrine facilities	Sum	1		
1.1.11			f) Tools and equipment	Sum	1		
1.1.12			g) Water supplies, electrical power and telecommunication	Sum	1		
1.1.13			h) Dealing with water	Sum	1		
1.1.14			i) Access	Sum	1		
1.1.15			j) Plant	Sum	1		
	PSA 8.3.5		Additional Contractual Obligations				
1.1.16	PSA 8.3.5.1		a) Notices and warnings to customers	Sum	1		
1.1.17	PSA 8.3.5.2		b) OHS Act Obligations	Sum	1		
1.1.18	PSA 8.3.5.3		c) EMP Obligations	Sum	1		
1.1.19	8.3.4		Remove Engineer's and Contractor's Site establishment on completion	Sum	1		
1.2	8.4		TIME RELATED ITEMS				
1.2.1	8.4.1		Contractual Requirements	Sum	1		
	8.4.2		Operate and maintain facilities on site for the duration of construction:				
TOTAL CARRIED FORWARD							

CONTRACT JW14301R

Linbro Park Water Upgrade

SECTION 1: PRELIMINARY AND GENERAL

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
	1200AB		Facilities for Engineer (refer to PSAB)				
1.2.2	1200AB 8.2.1		a) Office Building (1 No.) (20m²) (PSAB 3.2.1)	Sum	1		
1.2.3	1200AB 8.2.1		b) Telephone (and computer equipment) (PSAB 4.1)	Sum	1		
1.2.4	1200AB 8.2.1		c) Nameboard (2 No.) (PSAB 3.1)	Sum	1		
1.2.5	1200AB 8.2.1		d) Car Port - single (PSAB 3.3)	Sum	1		
	8.4.2.2		Facilities for Contractor				
1.2.6			a) Offices and storage sheds	Sum	1		
1.2.7			b) Workshops	Sum	1		
1.2.8			c) Laboratories	Sum	1		
1.2.9			d) Living accommodation	Sum	1		
1.2.10			e) Ablution and latrine facilities	Sum	1		
1.2.11			f) Tools and equipment	Sum	1		
1.2.12			g) Water supplies, electrical power and telecommunication	Sum	1		
1.2.13			h) Concrete batching plant	Sum	1		
1.2.14			i) Dealing with water	Sum	1		
1.2.15			j) Access and security	Sum	1		
1.2.16			k) Plant	Sum	1		
1.2.17	8.4.3		Supervision for duration of contract	Sum	1		
1.2.18	8.4.4		Company and Head Office overhead costs	Sum	1		
	PSA 8.4.6		Additional Obligations				
1.2.19	PSA 8.4.6.1		OHS Act Obligation (see C2.1.3.1)	Sum	1		
1.2.20	PSA 8.4.6.3		Provision of Community Liaison Officer	Month	9		
1.2.21	PSA 8.4.6.2	SC	Security Services Costs	Month	9		
1.3	8.5		SUMS STATED PROVISIONALLY BY THE ENGINEER				
1.3.1	PSA 8.5 (b)(1)(i)		Alteration to existing services by authorities	Prov Sum	1	R 116,600.00	R 116,600.00
1.3.2	PSA 8.5 (b)(2)(i)		Overheads, Charges and profits on (1)(i)	%	R 116,600.00		
1.3.3	PSA 8.5 (b)(1)(ii)		Control tests by independent laboratory	Prov Sum	1	R 58,300.00	R 58,300.00
TOTAL CARRIED FORWARD							

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Linbro Park Water Upgrade

SECTION 1: PRELIMINARY AND GENERAL

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
1.3.4	PSA 8.5 (b)(2)(ii)		Overheads, Charges and profits on (1)(ii)	%	R 116,600.00		
1.3.5	PSA 8.5 (b)(1)(iii)		Provision of photographic records	Prov Sum	1	R 1,166.00	R 1,166.00
1.3.6	PSA 8.5 (b)(2)(iii)		Overheads, Charges and profits on (1)(iii)	%	R 1,166.00		
1.3.7	PSA 8.5 (b)(1)(iv)		CLO and CSO	Prov Sum	1	R 110,000.00	R 110,000.00
1.3.8	PSA 8.5 (b)(2)(iv)		Overheads, Charges and profits on (1)(iv)	%	R 110,000.00		
1.3.9	PSA 8.5 (b)(1)(v)		Temporary protection of services	Prov Sum	1	R 34,980.00	R 34,980.00
1.3.10	PSA 8.5 (b)(2)(v)		Overheads, Charges and profits on (1)(v)	%	R 34,980.00		
1.3.11	PSA 8.5 (b)(1)(vi)		Reinstatement of asphalt by JRA	Prov Sum	1	R 100,000.00	R 100,000.00
1.3.12	PSA 8.5 (b)(2)(vi)		Overheads, Charges and profits on (1)(vi)	%	R 100,000.00		
1.3.13	PSA 8.5 (b)(1)(vii)		Supply or hire of specialist equipment	Prov Sum	1	R 29,150.00	R 29,150.00
1.3.14	PSA 8.5 (b)(2)(vii)		Overheads, Charges and profits on (1)(vii)	%	R 29,150.00		
1.3.15	PSA 8.5 (b)(1)(viii)		Training of labour	Prov Sum	1	R 440,000.00	R 440,000.00
1.3.16	PSA 8.5 (b)(2)(viii)		Overheads, Charges and profits on (1)(viii)	%	R 440,000.00		
1.3.17	PSA 8.5 (b)(1)(ix)		Training for Interns	Prov Sum	1	R 250,000.00	R 250,000.00
1.3.18	PSA 8.5 (b)(2)(ix)		Overheads, Charges and profits on (1)(ix)	%	R 250,000.00		
1.3.19	PSAB 4.1		Telephone and data charges for Engineers Representative	Prov Sum	1	R 17,490.00	R 17,490.00
1.3.20			Overhead, charges and profit on Item 1.3.17	%	R 17,490.00		
1.3.21	PSSC 1		Value of Subcontracted works	Prov Sum	1	R 12,085,056.38	R 12,085,056.38
1.3.22	PSSC 2		Management fee for the Main Contractor to oversee sub-contracted works. (the main contractor will retain liability and responsibility for the management, scheduling, and quality control of all works performed by the sub-contractor)	%	R12,085,056.38		
1.3.23	PSSC 3		Fixed-Charge items for the sub-contractors Contractual Requirements	Prov Sum		R 314,363.39	R 314,363.39
1.3.24	PSSC 4		Overhead, charges and profit for the Main Contractor to provide for fixed-charge items for the sub-contractors Contractual Requirements	%	R 314,363.39		
1.3.25	PSSC 5		Time Related items for the sub-contractors Contractual Requirements	Prov Sum		R 314,363.39	R 314,363.39
1.3.26	PSSC 6		Overhead, charges and profit for the Main Contractor to provide for time related items for the sub-contractors Contractual Requirements	%	R 314,363.39		
1.3.27	PSSC 7		Provide administrative, planning and on the job training to SMME's	Prov Sum	1	R 440,000.00	R 440,000.00
1.3.28	PSSC 8		Overhead, charges and profit on SMME training	%	R440,000.00		
1.3.29	PSA 8.5 (b)(1)(ix)		Cathodic Protection installation	Prov Sum	1	R 1,650,000.00	R 1,650,000.00
1.3.30	PSA 8.5 (b)(2)(ix)		Overhead, charges and profit on Cathodic Protection Installation	%	R1,650,000.00		
TOTAL CARRIED FORWARD							

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Linbro Park Water Upgrade

SECTION 1: PRELIMINARY AND GENERAL

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
1.4	8.7		DAY WORK				
1.4.1	PSA 8.7.1.2		Allowance for labour				
1.4.1.1			Labour: Skilled	hour	40		
1.4.1.2			Labour: Semi-Skilled	hour	80		
1.4.1.3			Labour: Unskilled	hour	350		
1.4.1.4			Qualified Electrical Safety Officer	hour	640		
1.4.2	PSA 8.7.1.2		Allowance for material	Prov Sum	1	R 75,000.00	R 75,000.00
1.4.3	PSA 8.7.1.2		Percentage adjustment to item 1.4.3	%	R 75,000.00		
1.4.4	PSA 8.7.1.2		Allowance for plant				
1.4.4.1			a) Backactors				
1.4.4.2			i) TLB	hr	10		
1.4.4.3			ii) 100kW, 23 ton	hr	10		
1.4.4.4			b) Compactors				
1.4.4.5			i) Pedestrian vibrating roller (Bomag 60 or similar)	hr	10		
1.4.4.6			ii) Vibratory roller 10t or similar	hr	10		
1.4.4.7			c) Trucks				
1.4.4.8			i) 6 m³ tip truck	hr	10		
1.4.4.9			ii) 10 m³ tip truck	hr	10		
1.4.4.10			iii) Water truck, 50001	hr	10		
1.4.4.11			Net cost of plant actually used for the Works (not specified above)	Prov sum	1	R 30,000.00	R 30,000.00
1.4.4.12	PSA 8.7.1.2		Percentage adjustment to item 1.4.4.11	%	R 50,000.00		
1.5	8.8		TEMPORARY WORKS				
1.5.1	8.8.2		Dealing with traffic and maintain road (or accommodation of traffic)	Sum	1		
	8.8.4		Existing Services				
1.5.2	PSA 8.8.4		b) Excavate by hand in soft material to expose existing services	m³	100		
1.5.3	PSA 8.8.4		c) Temporary protection of exposed services	sum	1		
1.5.4	PSA 8.8.6		Special water control	Sum	1		
TOTAL CARRIED FORWARD							

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Linbro Park Water Upgrade

SECTION 1: PRELIMINARY AND GENERAL

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
1.5.5	PSA 8.8.7		Dealing with other service authorities, application for wayleaves, etc.	Sum	1		
1.5.6	PSA 8.8.5		Survey and setting out of works	Sum	1		
SECTION 1: TOTAL CARRIED FORWARD TO SUMMARY							

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
SECTION 2: EARTHWORKS (PIPE TRENCHES)							
FOR PAYMENT REF. PREFIX A - REFER TO PARTICULAR SPECIFICATION, SECTION D [MEASUREMENT AND PAYMENT]. FOR ALL OTHER PREFIXES, REFER TO SANS 1200 AS AMENDED							
	SANS 1200 DB		Earthworks (Pipe Trenches)				
	PSDB 8.3.5		Services that Intersect or Adjoin a Pipe Trench				
2.1	PSDB 8.3.5(a)		Services that intersect a trench				
2.1.1		SC	Sewer pipes up to 600 mm Dia.	No.	4		
2.1.2		SC	Stormwater pipes up to 1200 mm Dia.	No.	6		
2.1.3		SC	Water pipes up to 500mm Dia.	No	6		
2.1.4		SC	Water pipes between 500mm Dia and 1200mm Dia	No	2		
2.1.5		SC	Electrical Cables	No	10		
2.1.6		SC	Fibre Optic Cable	No	4		
2.1.7		SC	Telkom Cable	No	4		
2.1.8		SC	Overhead electricity lines	No	4		
2.2	8.3.5(b)		Services that adjoin a trench				
2.2.1		SC	Existing up to 600 mm ND steel pipeline (water)	m	1200		
2.2.2		SC	Existing 600 mm up to 1200mm ND steel pipeline (water)	m	600		
2.2.3		SC	Electrical Cables	m	500		
2.2.4		SC	Fibre Optic Cable	m	100		
2.2.5		SC	Telkom Cable	m	50		
2.2.6		SC	Overhead electricity lines	m	50		
2.3	PSDB 8.3.5(c)		Services that require special care (electricity and telecommunication poles)	No	20		
2.4	8.3.6		Finishing				
2.4.1	8.3.6.1(d)	SC	Reinstate road surfaces complete with all courses: Brick Paving	m ²	100		
2.5	PSDB 8.3.6.2		Reinstate of surfacing for footways				
2.5.1	PSDB 8.3.6.2	SC	a)Brick paving	m ²	50		
2.5.2	PSDB 8.3.6.2	SC	b)Concrete paving	m ²	50		
2.5.3	PSDB 8.3.6.2	SC	c)Concrete slabs	m ²	50		
TOTAL CARRIED FORWARD							

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Linbro Park Water Upgrade

SECTION 2: EARTHWORKS (PIPE TRENCHES)

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
2.6	PSDB 8.3.6.3	SC	Reinstate Kerbs and Channels	m ²	100		
2.7	PSDB 8.3.6.4	SC	Reinstatement of grassed surfaces	m ²	1000		
2.8	PSDB 8.3.6.5		Reinstatement of recreational areas				
2.8.1		SC	a) Bushes and Scrubs up to 1.5 m	m	200		
2.8.2		SC	a) Moving above ground boulders	No	20		
			THE FOLLOWING IS FOR THE EXCAVATION OF A TRENCH FOR A 1100 mm ND STEEL PIPELINE: MINIMUM WIDTH - 2000mm JOINT HOLE WIDTH - 2200mm AVERAGE DEPTH TO INVERT - 2.6 m MAXIMUM DEPTH TO INVERT - 4.5m APPROXIMATE LENGTH - 690 m				
2.9	Particular Partic C: Section A ASC 1		Excavations and Backfilling Pipe Trench etc.				
2.9.1	ASC 1(a)	SC	a) Set out the work and control line and grade of all stages of excavation and preparation of trench	Sum	1		
2.9.2	ASC 1(c)	SC	c) Provide a pipe laying platform alongside the trench for pipe laying operations	Sum	1		
2.10	SANS 1200C 8.2.1	SC	Clear and grub	m ²	4830		
2.10.1	8.2.2		Remove and grub large trees and stumps of girth:				
2.10.1.1		SC	a) over 1m and up to and including 2m	No	10		
2.10.1.2		SC	b) over 2m and up to and including 3m	No	10		
2.10.1.3		SC	c) over 3m, in steps of 1m	No	1		
2.11			Top soil :				
2.11.1	ASC 5	SC	a) Excavate, stockpile and replace (300 mm thick)	m ³	414		
2.12	ASC 8		Excavate in Bulk :				
2.12.1		SC	a) In soft material (up to 3m deep)	m ³	1060		
2.12.2		SC	b) In rock (up to 3m deep)	m ³	1966		
2.12.3		SC	c) In soft material (3-5.5m deep)	m ³	378		
2.12.4		SC	d) In rock (3-7m deep)	m ³	378		
2.13	PSDB 8.3.2b	SC	Extra over on item 2.12 for excavation in narrow servitude	m	100		
2.14	ASC 7		Widen and deepen the trench for joint and lifting band holes :				
2.14.1		SC	a) In soft material	m ³	17		
2.14.2		SC	b) In rock	m ³	150		
2.15	ASC 8		Additional excavation for widening and deepening the pipe trench for valve chambers, thrust blocks, structures, or for any sundry excavations Maximum depth - 5.5 m				
TOTAL CARRIED FORWARD							

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SECTION 2: EARTHWORKS (PIPE TRENCHES)

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
2.15.1			a) In soft material	m ³	50		
2.15.2			b) In rock	m ³	70		
2.16	ASC 12		The following for providing fill material at the trench side				
2.16.1	ASC 12.1		a) Provide Class I fill material as follows:				
2.16.1.1			i) Select from spoil deposited alongside the trench	m ³	1480		
2.16.1.2			ii; and iv) Obtain at a source other than trench excavation (i.e. import)	m ³	985		
2.16.1.3			iii) extra over items i) and ii) to sieve material	m ³	1230		
2.16.2	ASC 12.2		b) Provide Class II fill material as follows:				
2.16.2.1			i) Select from spoil deposited alongside the trench	m ³	600		
2.16.2.2			ii; and iv) Obtain at a source other than trench excavation (i.e. import)	m ³	600		
2.16.3	ASC 12.4		c) 38 mm stone from any source	m ³	75		
2.16.4	ASC 12.5		d) Soil for soil cement from any source	m ³	20		
2.16.5	ASC 12.6		e) Crusher run from any source	m ³	10		
2.17			Load up, transport along trench or to trench, to point of backfilling if distance more than 200 m materials in (a) and (b) above.	m ³ .km	100		
			THE FOLLOWING IN PREPARING THE TRENCH FLOOR, PLACING THE PIPE BED FOUNDATION AND FORMING THE PIPE BED.				
2.18	ASC 13.		Prepare the trench floor:				
2.18.1	ASC 13.1.3	SC	a) In material of adequate bearing capacity and suitable for the pipe bed	m ²	5		
2.18.2	ASC 13.3	SC	b) In soil of inadequate bearing capacity	m ²	280		
2.18.3	ASC 13.5	SC	c) In material of adequate bearing capacity but unsuitable for the pipe bed	m ²	1105		
2.19	ASC 13		Filling in specified over-excavation:				
2.19.1	ASC 13.3.1	SC	a) Supply and place Kaymat U44	m ²	560		
2.19.2	ASC 13.3.1	SC	b) Place and compact 38 mm stone	m ³	75		
2.20	ASC 13.4.2	SC	Construct the 150 mm thick pipe bed foundation using selected fill (Class I)	m ³	210		
2.21	ASC 14	SC	Form the pipe bed	m ²	1380		
			THE FOLLOWING IN BACKFILLING AND DISPOSAL OF SURPLUS SPOIL AND UNDESIRABLE MATERIAL:				
2.22	ASC 12		Backfill the trench and additional excavations				
2.22.1		SC	a) Stage I	m ³	2330		
TOTAL CARRIED FORWARD							

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SECTION 2: EARTHWORKS (PIPE TRENCHES)

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
2.22.2		SC	b) Stage II	m ³	1190		
2.23	ASC 13		Extra over Item ASC 12 to increase the degree of compaction of the backfill around and above the pipe:				
2.23.1	ASC 13.1.3	SC	a) Stage I from 90 to 95 percent	m ³	675		
2.23.2		SC	b) Stage II from 85 to 95 percent	m ³	120		
2.24	ASC 12.3	SC	Backfill the trench with no fines concrete	m ³	10		
2.25	ASC 12.5.1	SC	Backfill the trench and other excavations with crusher run fill or soilcrete	m ³	30		
2.26	ASC 28	SC	Dispose of surplus spoil and undesirable material and reinstate surface:				
2.26.1		SC	a) Within 2 km of the Works	m ³	555		
2.26.2		SC	b) 2 km to 5 km from the Works	m ³	1290		
2.27	ASC 28.5		Spread surplus spoil over and on sides of trench	m ³	20		
			THE FOLLOWING IN SUNDRY ITEMS:				
2.28	ASC 19		Remove and reinstate fences and walls at pipeline crossings and where instructed by Engineer				
2.28.1	ASC 19.4 & ASC 19.5	SC	a) Security wall (palisade) with electric fence: Section to be replaced 10m long	No	3		
	ASC 19.1& ASC 19.3	SC	b) Prefab wall: Section to be replaced: 600m long	No	1		
2.29	ASC 19.2	SC	Supply, erect and remove temporary five strand barbed wire fences to protect excavations	m	640		
2.30	ASC 19.4.4	SC	Supply, erect and remove security fence to property owner's specifications	m	450		
2.31		SC	Form firebreaks	m ²	640		
2.32	ASC 25		Discontinue operations unexpectedly and transfer plant, equipment and labour (provisional item)				
2.32.1			a) Over a route distance not exceeding 640m	No of transfers	2		
			THE FOLLOWING IS FOR THE EXCAVATION OF A TRENCH FOR A 1000 mm ND STEEL PIPELINE: MINIMUM WIDTH - 1900mm JOINT HOLE WIDTH - 2100mm AVERAGE DEPTH TO INVERT - 2.5 m MAXIMUM DEPTH TO INVERT - 4.4m APPROXIMATE LENGTH - 100 m				
2.33	ASC 1		Excavations and Backfilling Pipe Trench etc.				
2.33.1	ASC 1(a)		a) Set out the work and control line and grade of all stages of excavation and preparation of trench	Sum	1		
2.33.2	ASC 1(c)		b) Provide a pipe laying platform alongside the trench for pipe laying operations	Sum	1		
2.34	SANS 1200C 8.2.1	SC	Clear and grub	m ²	700		
2.34.1	8.2.2		Remove and grub large trees and stumps of girth:				
2.34.1.1		SC	a) over 1m and up to and including 2m	No	1		
2.34.1.2		SC	b) over 2m and up to and including 3m	No	1		
TOTAL CARRIED FORWARD							

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Linbro Park Water Upgrade

SECTION 2: EARTHWORKS (PIPE TRENCHES)

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
2.34.1.3	ASC 5	SC	c) over 3m, in steps of 1m	No	1		
2.35			Top soil :				
2.35.1			a) Excavate and stockpile (300 mm thick)	m³	60		
2.35.2			b) Replace in top layer of backfilled trench	m³	60		
2.36	ASC 6		Excavate in Bulk :				
2.36.1			a) In soft material (up to 3m deep)	m³	140		
2.36.2			b) In rock (up to 3m deep)	m³	260		
2.36.3			c) In soft material (3-7m deep)	m³	50		
2.36.4	PSDB 8.3.2b		d) In rock (3-7m deep)	m³	50		
2.37			Extra over on item 2.36 for excavation in narrow servitude	m	700		
2.38			Widen and deepen the trench for joint and lifting band holes :				
2.38.1			a) In soft material	m³	7		
2.38.2	ASC 8		b) In rock	m³	60		
2.39			Additional excavation for widening and deepening the pipe trench for valve chambers, thrust blocks, structures, or for any sundry excavations				
2.39.1			Maximum depth - 4 m				
2.39.2			a) In soft material	m³	136		
2.39.3	ASC 12		b) In rock	m³	204		
2.40			The following for providing fill material at the trench side				
2.40.1			a) Provide Class I fill material as follows:				
2.40.1.1			i) Select from spoil deposited alongside the trench	m³	205		
2.40.1.2	ASC 12.1		ii; and iv) Obtain at a source other than trench excavation (i.e. import)	m³	140		
2.40.1.3			iii) extra over items i) and ii) to sieve material	m³	170		
2.40.2			b) Provide Class II fill material as follows:				
2.40.2.1			i) Select from spoil deposited alongside the trench	m³	85		
2.40.2.2	ASC 12.2		ii; and iv) Obtain at a source other than trench excavation (i.e. import)	m³	85		
2.40.3			c) 38 mm stone from any source	m³	10		
2.40.4			d) Soil for soil cement from any source	m³	20		
TOTAL CARRIED FORWARD							

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Linbro Park Water Upgrade

SECTION 2: EARTHWORKS (PIPE TRENCHES)

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
2.40.5	ASC 12.6	SC	e) Crusher run from any source	m ³	10		
2.41		SC	Load up, transport along trench or to trench, to point of backfilling if distance more than 200 m materials in (a) and (b) above.	m ³ .km	10		
	ASC 13.		THE FOLLOWING IN PREPARING THE TRENCH FLOOR, PLACING THE PIPE BED FOUNDATION AND FORMING THE PIPE BED.				
2.42			Prepare the trench floor:				
2.42.1	ASC 13.1.3	SC	a) In material of adequate bearing capacity and suitable for the pipe bed	m ²	5		
2.42.2	ASC 13.3	SC	b) In soil of inadequate bearing capacity	m ²	40		
2.42.3		SC	c) In material of adequate bearing capacity but unsuitable for the pipe bed	m ²	160		
2.43	ASC 13.5	SC	Refill specified over-excavation:				
2.43.1	ASC 13.3.1	SC	a) Supply and place Kaymat U44	m ²	190		
2.43.2	ASC 13.1.3	SC	b) Place and compact 38 mm stone	m ³	10		
2.44	ASC 13.3	SC	Construct the 150 mm thick pipe bed foundation using selected fill (Class I)	m ³	30		
2.45	ASC 14	SC	Form the pipe bed	m ²	190		
			THE FOLLOWING IN BACKFILLING AND DISPOSAL OF SURPLUS SPOIL AND UNDESIRABLE MATERIAL:				
2.46	ASC 12		Backfill the trench and additional excavations				
2.46.1		SC	a) Stage I	m ³	210		
2.46.2		SC	b) Stage II	m ³	170		
2.47	ASC 13		Extra over Item ASC 12 to increase the degree of compaction of the backfill around and above the pipe:				
2.47.1	ASC13.1.3	SC	a) Stage I from 90 to 95 percent	m ³	95		
2.47.2		SC	b) Stage II from 85 to 95 percent	m ³	20		
2.48	ASC 12.3	SC	Backfill the trench with no fines concrete	m ³	5		
2.49	ASC 12.5.1		Backfill the trench and other excavations with crusher run fill or soilcrete	m ³	10		
2.50	ASC 28		Dispose of surplus spoil and undesirable material and reinstate surface:				
2.50.1			a) Within 2 km of the Works	m ³	160		
2.50.2			b) 2 km to 5 km from the Works	m ³	380		
2.51	ASC 28.5		Spread surplus spoil over and on sides of trench	m ³	10		
			THE FOLLOWING IN SUNDRY ITEMS:				
2.52	ASC 19		Remove and reinstate fences and walls at pipeline crossings and where instructed by Engineer				
TOTAL CARRIED FORWARD							

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SECTION 2: EARTHWORKS (PIPE TRENCHES)

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
2.52.1		SC	a) Security wall (palisade) with electric fence: Section to be replaced 5m long	No	5		
2.53	ASC 19.4 & ASC 19.5	SC	Supply, erect and remove temporary five strand barbed wire fences to protect excavations	m	200		
2.54	ASC 19.1& ASC 19.3	SC	Supply, erect and remove security fence to property owner's specifications	m	250		
2.55	ASC 19.2	SC	Form firebreaks	m²	100		
2.56	ASC 19.4.4		Discontinue operations unexpectedly and transfer plant, equipment and labour (provisional item)				
2.56.1			a) Over a route distance not exceeding 80m	No of transfers	1		
			THE FOLLOWING IS FOR THE EXCAVATION OF A TRENCH FOR A 400 mm ND STEEL PIPELINE: MINIMUM WIDTH - 1 200mm JOINT HOLE WIDTH - 1 400mm AVERAGE DEPTH TO INVERT - 1.4 m MAXIMUM DEPTH TO INVERT - 1.5m APPROXIMATE LENGTH - 160 m				
2.57	Particular Portic C: Section A ASC 1		Excavations and Backfilling Pipe Trench etc				
2.57.1	ASC 1(a)		a) Set out the work and control line and grade of all stages of excavation and preparation of trench	Sum	1		
2.57.2	ASC 1(c)		b) Provide a pipe laying platform alongside the trench for pipe laying operations	Sum	1		
2.58	SANS 1200C 8.2.1	SC	Clear and grub	m²	1120		
2.58.1	8.2.2		Remove and grub large trees and stumps of girth:				
2.58.1.1		SC	a) over 1m and up to and including 2m	No	1		
2.58.1.2		SC	b) over 2m and up to and including 3m	No	1		
2.58.1.3		SC	c) over 3m, in steps of 1m	No	1		
2.59	ASC 5		Top soil :				
2.59.1			a) Excavate and stockpile (300 mm thick)	m³	60		
2.59.2			b) Replace in top layer of backfilled trench	m³	60		
2.60	ASC 6		Excavate in Bulk :				
2.60.1			a) In soft material (up to 3m deep)	m³	230		
2.60.2			b) In rock (up to 3m deep)	m³	57		
2.60.3			c) In soft material (3-7m deep)	m³	50		
2.60.4			d) In rock (3-7m deep)	m³	25		
2.61	PSDB 8.3.2b		Extra over on item 2.60 for excavation in narrow servitude	m	150		
2.62	ASC 7		Widen and deepen the trench for joint and lifting band holes :				
2.62.1			a) In soft material	m³	23		
2.62.2			b) In rock	m³	6		
TOTAL CARRIED FORWARD							

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SECTION 2: EARTHWORKS (PIPE TRENCHES)

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
2.63	ASC 8		Additional excavation for widening and deepening the pipe trench for valve chambers, thrust blocks, structures, or for any sundry excavations				
2.63.1			Maximum depth - 4 m				
2.63.2			a) In soft material	m ³	50		
2.63.3			b) In rock	m ³	25		
2.64	ASC 12		The following for providing fill material at the trench side				
2.64.1	ASC 12.1		a) Provide Class I fill material as follows:				
2.64.1.1			i) Select from spoil deposited alongside the trench	m ³	216		
2.64.1.2			ii; and iv) Obtain at a source other than trench excavation (i.e. import)	m ³	144		
2.64.1.3			iii) extra over items i) and ii) to sieve material	m ³	180		
2.64.2	ASC 12.2		b) Provide Class II fill material as follows:				
2.64.2.1			i) Select from spoil deposited alongside the trench	m ³	86		
2.64.2.2			ii; and iv) Obtain at a source other than trench excavation (i.e. import)	m ³	86		
2.64.3	ASC 12.4		c) 38 mm stone from any source	m ³	15		
2.64.4	ASC 12.5		d) Soil for soil cement from any source	m ³	5		
2.64.5	ASC 12.6		e) Crusher run from any source	m ³	5		
2.65			Load up, transport along trench or to trench, to point of backfilling if distance more than 200 m materials in (a) and (b) above.	m ³ .km	10		
			THE FOLLOWING IN PREPARING THE TRENCH FLOOR, PLACING THE PIPE BED FOUNDATION AND FORMING THE PIPE BED.				
2.66	ASC 13.		Prepare the trench floor:				
2.66.1	ASC 13.1.3		a) In material of adequate bearing capacity and suitable for the pipe bed	m ²	116		
2.66.2	ASC 13.3		b) In soil of inadequate bearing capacity	m ²	40		
2.66.3	ASC 13.5		c) In material of adequate bearing capacity but unsuitable for the pipe bed	m ²	40		
2.67	ASC 13.3.1		Refill specified over-excavation:				
2.67.1	ASC 13.3.1		a) Supply and place Kaymat U44	m ²	15		
2.67.2	ASC 13.3.1		b) Place and compact 38 mm stone	m ³	15		
2.68	ASC 14.1		Construct the 150 mm thick pipe bed foundation using selected fill (Class I)	m ³	30		
2.69	ASC 14.2		Form the pipe bed	m ²	77		
TOTAL CARRIED FORWARD							

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SECTION 2: EARTHWORKS (PIPE TRENCHES)

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
			THE FOLLOWING IN BACKFILLING AND DISPOSAL OF SURPLUS SPOIL AND UNDESIRABLE MATERIAL:				
2.70	ASC12		Backfill the trench and additional excavations				
2.70.1		SC	a) Stage I	m ³	230		
2.70.2		SC	b) Stage II	m ³	170		
2.71	ASC 13		Extra over Item ASC 12 to increase the degree of compaction of the backfill around and above the pipe:				
2.71.1		SC	a) Stage I from 90 to 95 percent	m ³	100		
2.71.2		SC	b) Stage II from 85 to 95 percent	m ³	18		
2.72	ASC 28 & ASC 11.4	SC	Backfill the trench with no fines concrete	m ³	5		
2.73	ASC 13.1.3	SC	Backfill the trench and other excavations with crusher run fill or soilcrete	m ³	5		
2.74	ASC 28.5		Dispose of surplus spoil and undesirable material and reinstate surface:				
2.74.1		SC	a) Within 2 km of the Works	m ³	160		
2.74.2		SC	b) 2 km to 5 km from the Works	m ³	380		
2.75	ASC 28.5	SC	Spread surplus spoil over and on sides of trench	m ³	10		
			THE FOLLOWING IN SUNDRY ITEMS:				
2.76	ASC 19		Remove and reinstate fences and walls at pipeline crossings and where instructed by Engineer				
2.76.1	ASC 19.4 & ASC 19.5	SC	a) Security wall (palisade) with electric fence: Section to be replaced 5m long	No	1		
2.77	ASC 19.1 & ASC 19.3	SC	Supply, erect and remove temporary five strand barbed wire fences to protect excavations	m	100		
2.78	ASC 19.2	SC	Form firebreaks	m ²	100		
2.79			Discontinue operations unexpectedly and transfer plant, equipment and labour (provisional item)				
2.79.1			a) Over a route distance not exceeding 80m	No of transfers	1		
SECTION 2: TOTAL CARRIED FORWARD TO SUMMARY							

ITEM NO.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
			SECTION 3: PIPELINES				
FOR PAYMENT REF. PREFIXED A, B OR C - REFER TO PARTICULAR SPECIFICATION, SECTION D [MEASUREMENT AND PAYMENT]. FOR ALL OTHER PREFIXES, REFER TO SANS 1200 AS AMENDED							
UNLESS OTHERWISE SPECIFIED, ALL SPECIALS EQUAL OR LARGER THAN 400 mm ND SHALL BE TO THE SAME SPECIFICATION. ALL SPECIALS SMALLER THAN 400 mm ND SHALL BE AS SPECIFIED IN THE SPECIFICATION AND ON DRAWINGS							
SUPPLY, LAYING AND JOINTING OF 1118 mm OD STEEL PIPES, API 5L X52, RPU COATED (OR OTHER AS SPECIFIED) AND SFE LINED, 12.1 m STANDARD LENGTHS (INCL SHORT SECTION OF 900 mm ND)							
3.1	BSC 1		Supply of pipes 1118 mm OD	m	680		
3.2	BSC 3		Unload and transport pipes on site from delivery vehicle 1118 mm OD	m	680		
3.3	BSC 3		Examine coatings for holidays 1118 mm OD	m	680		
3.4	BSC 4		Place pipe in trench, install and line up 1118 mm OD	m	680		
3.5	BSC 6		Welded Joints				
3.5.1			Make socket and spigot joints, fillet welded (1 118mm OD pipes)	No	2		
3.5.2			Make plain ended joints butt welded (1 118 mm OD pipes)	No	60		
3.5.3			Make plain ended joints butt welded (900 mm ND pipes)	No	10		
3.6	BSC 7.7		Complete the protective coatings at joints (1 118 mm OD pipes)				
3.6.1			a) RPU or other as specified	No	60		
3.6.2			b) Internal SF Epoxy lining	No	60		
3.7	BSC 7.7		Complete the protective coatings at joints (900 mm ND pipes)				
3.7.1			a) RPU or other as specified	No	15		
3.7.2			b) Internal SF Epoxy lining	No	15		
3.8	BSC 9		Steel pipe vertical, horizontal and composite bends with deflection angles as follows:				
3.8.1			For 1 118 mm OD pipe				
3.8.1.1			a) 2° to 15° (mitred bends)	No	3		
3.8.1.2			b) 15° to 30°	No	3		
3.8.1.3			c) 30° to 45°	No	4		
3.8.1.4			d) 45° to 60°	No	2		
3.8.1.5			e) 60° to 75°	No	1		
3.8.1.6			f) 75° to 90°	No	2		
3.9	BSC 9		Cut steel pipe and prepare ends to receive wrapper plate connections to pipe sets, bends or pipe specials and at isolation valves	No	11		
TOTAL CARRIED FORWARD							

ITEM NO.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
			THE FOLLOWING SUNDRY ITEMS:				
3.10			Supply, deliver, install, line up, drill and weld into the pipeline valves, steel special and regular pipe sections and fittings as follows: (All tees, bends and reducers shall be made of API 5L, X52, 12mm wall thickness with compensation plates and crotch plates as specified.)				
			All flanges in accordance with SABS 1123, Table 4000, unless otherwise stated				
3.10.1			Drawing No JW14301R-DET11 (Air Valve)				
3.10.1.1	BSC 10		Item 1: Reducing Tee 1 100/550mm. Branch 550mm flanged to SANS 1123 Table 4000/3, main stem plain ended for welding. Including compensation collar with W=986mm and T=20mm.	No	1		
3.10.1.2	BSC 10		Item 2: Spacer / Reducer 550/200mm ND, 300mm long, both ends flanged to SANS 1123 table 4000/3.	No	1		
3.10.1.3	BSC 11.1		Item 3: 200mm ND, class 40 Isolation valve	No	1		
3.10.1.4	BSC 11.3		Item 4: 200mm ND class 40 Air Valve	No	1		
3.10.2			Drawing No JW14301R-DET13 (Scour valve)				
3.10.2.1	BSC 10		Item 1: Steel to uPVC Flange adaptor PN40	No	1		
3.10.2.2	BSC 10		Item 2: Flanged distance piece 200 mm dia, flanged to SANS 1123 table 4000/3.	No	1		
3.10.2.3	BSC 11.1		Item 3: 200mm Class 40 gate valve	No	1		
3.10.2.4	BSC 10		Item 4: 60 degree spool pieces, flanged both ends to SANS 1123 table 4000/3.	No	2		
3.10.2.5	BSC12.1		Item 5: Reducing Tee 1 100/200mm. Branch 300mm flanged to SANS 1123 table 4000/3, main stem plain ended for welding. Including compensation collar.	No	1		
3.10.2.6	BSC10		Item 7: 200mm ND GMS puddle pipe 1500 mm long, flanged both ends to SANS 1123 table 4000/3. Complete with puddle flange	No	1		
3.10.2.7	BSC12		Item 8: 200 mm ND HDPE class 16 spacer pipe 6 000 mm length	No	1		
3.10.3			Drawing No JW14301R-DET15 (Isolation valve)				
3.10.3.1	BSC 10		Item 1: Reducing Tee 900/100 mm, main stem 400mm long, branch 300mm long. Main stem flanged one side to SANS 1123 table 4000/3, other end plain for welding. Branch flanged to SANS 1123 table 4000/3. Complete with compensation collar with W=190mm and T=10mm.	No	1		
3.10.3.2	BSC 11.1		Item 2: 900 mm Class 40 Wedge gate valve	No	1		
3.10.3.3	BSC 10		Item 3: 900mm ND 60 degree spool pieces, flanged both ends to SANS 1123 table 4000/3	No	2		
3.10.3.4	BSC 10		Item 4: Reducing Tee 900/100mm. Main stem 800mm long and branch 300mm long. Main stem flanged one side to SANS 1123 table 4000/3, other end plain for welding. Branch flanged to SANS 1123 table 4000/3. Complete with	No	1		
3.10.3.5	BSC 10		Item 5: 100 mm ND 90° short radius bend, flanged both ends to SANS 1123 table 4000/3.	No	2		
3.10.3.6	BSC 10		Item 6: 100mm ND spacer, length 566 mm, both ends flanged to SANS 1123 table 4000/3.	No	1		
3.10.3.7	BSC 11.1		Item 7: 100 mm Class 40 gate valve	No	1		
3.10.3.8	BSC 10		Item 8: 100mm ND 60 degree spool pieces, flanged both ends to SANS 1123 table 4000/3.	No	2		
3.10.3.9	BSC 10		Item 9: 100mm ND spacer, length 2 380 mm, both ends flanged to SANS 1123 table 4000/3.	No	1		
3.10.3.10	BSC 12.1		Item 10: Equal Tee 1500/1500mm. All ends plain ended for welding. Complete with crotch plate with thickness = 50mm, wye / base depth = 1253 mm and top depth = 454 mm.	No	1		
3.10.3.11	BSC 10		Item 11: 900mm ND puddle pipe, length 1 500 mm, both ends plain ended for welding. Puddle flange 650 mm from outer edge	No	2		
3.10.3.12	BSC 12.1		Item 12: 900 / 1 100 mm ND reducer, both ends plain for welding.	No	1		
TOTAL CARRIED FORWARD							

CONTRACT JW14301R Linbro Park Water Upgrade				SECTION 3: MEDIUM PRESSURE PIPELINES			
ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
3.10.3.13	BSC 12.1		Item 13: 1500 / 900 mm ND Reducer, both ends plain for welding. Overall	No	1		
3.11	PSL 8.2.17		Connection to existing mains and effect tie in, including the necessary work and arrangements for shut down				
3.11.1			a) New 900 mm ND to existing 1 500 mm ND pipe	No	1		
3.12	BSC 12.1		Supply, fit install and weld 1 100mm ND equal T-piece, one end of main stem flanged to table 4000/3 SANS1123, the other end plain for welding. Branch plain for welding. Complete with crotch plate with wye / base depth = 880mm, top depth = 355mm and plate thickness = 32mm. As per drawing JW14301R-DET22.	No	1		
3.13	BSC 12.1		Supply, fit, install and flange 1 100mm ND, 12 mm steel end cap (exopoly lined both sides) to T-piece as per drawing JW14301R-DET22.	No	1		
3.14	BSC 6.4.1		a) Radiographic examination of 100% of field butt welds	No	75		
3.15	BSC 6.3.3		b) Magnetic particles testing of 100% of fillet welds	No	2		
3.16	BSC 15.5		Water tightness and structural strength test of completed pipeline.	Sum	1		
3.17	BSC 15		Sum allowed for qualification of the Contractor's welding procedures by an approved inspection body. CONSTRUCTION OF VALVE CHAMBERS AND STRUCTURES. RATES TO PROVIDE FOR ALL COSTS INVOLVED FOR THE SUPPLY OF MATERIAL, INSTALLATION, ETC. FOR THE ENTIRE WORKS COMPLETE AS SHOWN ON THE DRAWINGS AND IN ACCORDANCE WITH THE SPECIFICATIONS. RATES TO EXCLUDE PIPING AND VALVES, DEPTH TO INVERT OF CHAMBERS AS SPECIFIED.	Prov Sum	1	R 23.320.00	R 23.320.00
3.18	CSC 1 - CSC 3		Air valve chamber, complete as per drawings JW14301R-DET11 and JW14301R-DET12. (Excluding all pipe fittings and specials)	No	1		
3.19	CSC 1 - CSC 3		Scour valve chamber, complete as per drawing JW14301R-DET13. (Excluding all pipe fittings and specials).	No	1		
3.20	CSC 1 - CSC 3		Isolation valve chamber, complete as per drawing JW14301R-DET15 and JW14301R-DET16. (Excluding all pipe fittings and specials).	No	1		
3.21	CSC 6.9		Supply and installation of Manhole covers				
3.21.1			a) for Air Valve Chamber	No	2		
3.21.2			b) for Scour Valve Chamber	No	2		
3.21.3			c) for Isolation Valve Chamber	No	1		
3.22	CSC 7		Cast thrust blocks of concrete class 25 including all necessary works and operations LAYING AND JOINTING OF 1 016 mm OD STEEL PIPES, API 5L X52, RPU COATED (OR OTHER AS SPECIFIED) AND EPOXY LINED, 12.1 m STANDARD LENGTHS	m³	20		
3.23	BSC 1		Supply of pipes	m	100		
3.24	BSC 3		Unload and transport pipes on site from delivery vehicle	m	100		
3.25	BSC 3		Examine coatings for holidays	m	100		
3.26	BSC 4		Place pipe in trench, install and line up	m	100		
3.27	BSC 6		Welded Joints				
3.27.1			Make socket and spigot joints, fillet welded (1 016mm OD pipes)	No	1		
3.27.2			Make plain ended joints butt welded (1016 mm OD pipes)	No	15		
TOTAL CARRIED FORWARD							

CONTRACT JW14301R Linbro Park Water Upgrade				SECTION 3: MEDIUM PRESSURE PIPELINES			
ITEM NO.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
3.28	BSC 7.7		Complete the protective coatings at joints (1 016 mm OD pipes)				
3.28.1			a) External RPU or other as specified	No	15		
3.28.2			b) Internal SF Epoxy lining	No	15		
3.29	BSC 7.7		Steel pipe vertical, horizontal and composite bends with deflection angles as follows:				
3.29.1			For 1 016 mm OD pipe				
3.29.1.1			a) 2° to 15° (mitred bends)	No	1		
3.29.1.2			b) 15° to 30°	No	1		
3.29.1.3			c) 30° to 45°	No	1		
3.29.1.4			d) 45° to 60°	No	1		
3.29.1.5			e) 60° to 75°	No	1		
3.29.1.6			f) 75° to 90°	No	1		
3.29.1.7			g) 500 / 1 000 tapers, all ends plain for welding	No	2		
3.30	BSC 9		Cut steel pipe and prepare ends to receive wrapper plate connections to pipe sets, bends or pipe specials and at isolation valves	No	8		
			THE FOLLOWING SUNDRY ITEMS:				
3.31			Supply, deliver, install, line up, drill and weld into the pipeline steel special and regular pipe sections and fittings as follows: (All tees, bends and reducers shall be made of API 5L, X52, 12mm wall thickness with compensation plates as specified.)				
			All flanges in accordance with SABS 1123, Table as specified				
3.31.1			Drawing No JW14301R-DET14 (Air Valve)				
3.31.1.1	BSC 11		Item 1: Reducing Tee 1 000/500mm ND. Branch flanged to SANS 1123 Table 4000/3, main stem plain ended for welding. Complete with compensation collar with W = 983mm and T = 12mm.	No	1		
3.31.1.2	BSC 11		Item 2: Spacer / Reducer 500/200mm ND, 300mm long, both ends flanged to SANS 1123 table 4000/3.	No	1		
3.31.1.3	BSC 11		Item 3: 200mm ND, class 40 Isolation valve	No	1		
3.31.1.4	BSC 11		Item 4: 200mm ND class 40 Air Valve	No	1		
3.31.2			Drawing No JW14301R-DET18 (Pressure reducing and flow meter pipe schedule)				
3.31.2.1	BSC 11.4		Item 1a & 1b: Puddle pipe, 1 000 mm long, flanged both ends to SANS 1123, Table 4000/3, other flanged both with sample point of 25mm nipple welded with thread cape, with puddle flange, as per JW14301R-DET18 Item 1a&1b.	No	4		
3.31.2.2	BSC 11.4		Item 2: 500mm ND, Class 40 Isolation valve(Wedge gate)	No	2		
3.31.2.3	BSC 11.4		Item 3: 500 mm ND Steel pipe 1605 mm long with pressure testing / sampling point (25 mm nipple and cap) Flanged to SANS 1123 Table 4000/3 both sides	No	2		
3.31.2.4	BSC 11.5		Item 4: 500mm ND Class 40 Pressure reducing valve	No	2		
3.31.2.5	BSC 11.5		Item 5: 500mm ND Steel pipe 1605mm long with pressure testing / sampling point (25 mm nipple and cap) Flanged to SANS 1123 Table 4000/3 on one end, other plain.	No	2		
TOTAL CARRIED FORWARD							

CONTRACT JW14301R Linbro Park Water Upgrade				SECTION 3: MEDIUM PRESSURE PIPELINES			
ITEM NO.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
3.31.2.6	BSC 11.5		Item 6: 500mm ND PIPE SECTION FLANGED ONE END,400mm Long 60° Flange Spool Piece other end. Drilled to TABLE 4000 SANS 1123.	No	2		
3.31.2.7	BSC 11.5		Item 7: 500mm ND Class 16 Isolation valve	No	2		
3.31.2.8	BSC 11.5		Item 8: Reducer 500 / 1 000 mm, both ends plain for welding	No	4		
3.31.2.9	BSC 11.5		Item 9: 1 000 mm ND special gusset Y-piece, plain ended	No	2		
3.31.2.10	BSC 11.5		Item 10: 500mm Nd 1520mm long pipe section flanged both ends to SANS 1123, Table 1600/3 ,	No	2		
3.31.2.11	BSC 11.5		Item 11: Puddle pipe, 2 286 mm long, flanged one end to SANS 1123, Table 1600/3, other end plain ended, with puddle flange	No	4		
3.31.2.12	BSC 11.4		Item 12: 500 mm ND EMF Flow Meter, Class 16	No	2		
3.31.3			Drawing No JW14301R-DET19 (Reservoir control valve pipe schedule)				
3.31.3.1	BSC 11.6		Item 13: 500 mm ND special gusset Y-piece, plain ended	No	2		
3.31.3.2	BSC 11.6		Item 14: Reducer 500 / 400 mm, both ends plain ended	No	2		
3.31.3.3	BSC 11.6		Item 15: Reducer 500 / 300 mm, both ends plain ended	No	2		
3.31.3.4	BSC 11.6		Item 16: 400 mm ND Puddle pipe, 1 000 mm long, flanged one end to SANS 1123 Table 1600/3, other end plain ended, with puddle flange	No	2		
3.31.3.5	BSC 11.6		Item 17: 300 mm ND Puddle pipe, 1 000 mm long, flanged one end to SANS 1123 Table 1600/3, other end plain ended, with puddle flange	No	2		
3.31.3.6	BSC 11.2.1		Item 18: 400mm ND Class 16 Isolation valve	No	4		
3.31.3.7	BSC 11.2.1		Item 19: 300mm ND Class 16 Isolation valve	No	4		
3.31.3.8	BSC 10.3		Item 20: 400 mm ND Flanged Steel pipe to SANS 1123 Table 1600/3, 1 220 mm long with pressure testing / sampling point (25 mm nipple)	No	2		
3.31.3.9	BSC 10.3		Item 21: 300 mm ND Flanged Steel pipe to SANS 1123 Table 1600/3, 1000 mm long with pressure testing / sampling point (25 mm nipple)	No	2		
3.31.3.10	BSC11.5		Item 22: 400mm ND Class 16 Pressure reducing valve	No	2		
3.31.3.11	BSC11.5		Item 23: 300mm ND Class 16 Pressure reducing valve	No	2		
3.31.3.12	BSC 11.6		Item 24: 400 mm ND Steel pipe flanged one end 60° Flanged spool piece, 25mm NIPPLE Welded on with threaded cap to SANS 1123 Table 1600/3, 850 mm long	No	2		
3.31.3.13	BSC 11.6		Item 25: 300 mm ND Steel pipe flanged one end to SANS 1123 Table 1600/3, 730 mm long with pressure testing / sampling point (25 mm nipple)	No	2		
3.31.3.14	BSC 11.6		Item 26: 400mm ND steel pipe,pipe flanged one end drille to SANS 1123 Table 4000, 300 mm long with pressure testing / sampling point (60° Flanged spool piece other end)	No	2		
3.31.3.15	BSC 11.6		Item 27: 300mm ND steel pipe,pipe flanged one end drille to SANS 1123 Table 4000, 268mm long with pressure testing / sampling point (60° Flanged spool piece other end)	No	2		
3.31.3.16	BSC 11.6		Item 28: 400mm ND Class 16 Level Control Valve,Flange to SANS 1123 TABLE 1600/3	No	2		
3.31.3.17	BSC 11.6		Item 29: 300mm ND Class 16 Level Control Valve,Flange to SANS 1123 TABLE 1600/3	No	2		
3.31.3.18	BSC 11.6		Item 30: 400 mm ND Spacer Pipe, 450 mm long, both ends flanged to SANS 1123 table 1600/3.	No	4		
3.31.3.19	BSC 11.6		Item 31: 300 mm ND Spacer Pipe, 450 mm long, both ends flanged to SANS 1123 table 1600/3.	No	4		
TOTAL CARRIED FORWARD							

CONTRACT JW14301R Linbro Park Water Upgrade			SECTION 3: MEDIUM PRESSURE PIPELINES				
ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
3.31.3.20	BSC 11.6		Item 32: 400mm ND Orifice Plate, Stainless Steel	No	2		
3.31.3.21	BSC 11.6		Item 33: 300mm ND Orifice Plate, Stainless steel	No	2		
3.31.3.22	BSC 11.6		Item 34: 400 mm ND Puddle pipe, 1 000 mm long, flanged both ends to SANS 1123 table 1600/3, complete with puddle flange.	No	2		
3.31.3.23	BSC 11.6		Item 35: 400 mm ND Straight spacer pipe, 744 mm long, both ends flanged to SANS 1123 table 1600/3.	No	1		
3.31.3.24	BSC 11.6		Item 36: 300 mm ND Puddle pipe, 2 100 mm long, flanged both ends to SANS 1123 table 1600/3, with puddle flange	No	2		
3.31.3.25	BSC 11.6		Item 37: 400 mm ND 90° gusset long radius bend, both ends flanged to SANS 1123 table 1600/3.	No	2		
3.31.3.26	BSC 11.6		Item 38: Reducer 300 / 400 mm, both ends flanged to SANS 1123 table 1600/3	No	2		
3.31.3.27	BSC 11.6		Item 39: 400 mm ND Spacer Pipe, 1 500 mm long, both ends flanged to SANS 1123 table 1600/3.	No	1		
3.31.3.28	BSC 11.6		Item 40: 400 mm ND Spacer Pipe, 3 500 mm long, both ends flanged to SANS 1123 table 1600/3.	No	1		
3.31.3.29	BSC 11.6		Item 41: 400 mm ND Spacer Pipe, 2 500 mm long, both ends flanged to SANS 1123 table 1600/3.	No	2		
3.31.3.30	BSC 11.6		Item 42: 400 mm ND Spacer Pipe, 6000mm long, both ends flanged to SANS 1123 table 1600/3.	No	9		
3.31.3.31	BSC 11.6		Item 43: 300 mm ND Spacer Pipe, 6000mm long, both ends flanged to SANS 1123 table 1600/3.	No	4		
3.31.3.32	BSC 11.6		Item 44: 25mm ND Steel , StopCock, Class 16	No	3		
3.31.3.33	BSC 11.6		Item 45: 32mm ND Steel , Puddle pipe, 380mm long,plain ended with puddle flange in the middle	No	1		
3.31.3.34	BSC 11.6		Item 46: 25mm ND HDPE pipe,Class 16 6000mm long,	No	1		
3.31.3.35	BSC 11.6		Item 46: 25mm ND HDPE pipe,Class 16 6000mm long,	No	1		
3.31.3.36	BSC 11.6		Item 47: 25mm ND Goose Neck	No	1		
3.31.3.37	BSC 11.6		Item 48: 25mm ND HDPE plasson compression fittings male adapter	No	2		
3.32	BSC 6		Overall Supply and install 1 000mm ND equal T-piece, both ends of main stem plain for welding, branch flanged to table 4000/3 SANS1123. Includes crotch plate with wye / base depth = 830mm, top depth = 340mm and plate thickness = 30mm. As per drawing JW14301R-DET22.	No	1		
3.33	BSC 6		Supply and fit 1 000mm ND, 12 mm steel end cap (epoxy lined both sides) to T-piece as per drawing JW14301R-DET22.	No	1		
3.34	BSC 6		Supply and install 1 000mm ND special gusset Y-piece, all ends welded. Complete with crotch plate with wye depth = 1355mm, base depth = 670mm, top depth = 362mm and plate thickness = 50mm. As per drawing JW14301R-DET22.	No	1		
3.35	BSC 6.4.1		a) Radiographic examination of 100% of field butt welds	No	20		
3.36	BSC 1 (e)		b) Magnetic particles testing of 10% of fillet welds	No	2		
3.37	BSC 15.5		Water tightness and structural strength test of completed pipeline.	Sum	1		
3.38	B15		Sum allowed for qualification of the Contractor's welding procedures by an approved inspection body.	Prov Sum	1	R 17,490.00	R 17,490.00
			CONSTRUCTION OF VALVE CHAMBERS AND STRUCTURES. RATES TO PROVIDE FOR ALL COSTS INVOLVED FOR THE SUPPLY OF MATERIAL, INSTALLATION, ETC. FOR THE ENTIRE WORKS COMPLETE AS SHOWN ON THE DRAWINGS AND IN ACCORDANCE WITH THE SPECIFICATIONS. RATES TO EXCLUDE PIPEING AND VALVES, DEPTH TO INVERT OF CHAMBERS AS SPECIFIED.				
3.39	CSC 1 - CSC 3		Air valve chamber, complete as per drawings JW14301R-DET11 and JW14301R-DET12. (Excluding all pipe fittings and specials)	No	1		
3.40	CSC 1 - CSC 3		Flow Meter Chamber, Complete as per drawings JW14301R-DET34 & JW14301R-DET34A (Excluding all pipe Fittings & Specials)	No	1		
3.41	CSC 6.9		GENERAL: Supply and installation of Manhole covers				
3.41.1			a) for Air Valve Chamber	No	1		
3.41.2			b) for Meter Chamber	No	1		
3.42	CSC 7.1		Cast thrust blocks of concrete class 25 including all necessary works and operations	m³	30		
TOTAL CARRIED FORWARD							

CONTRACT JW14301R Linbro Park Water Upgrade			SECTION 3: MEDIUM PRESSURE PIPELINES				
ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
			LAYING AND JOINTING OF 406 mm OD FLANGED STEEL PIPES, API 5L X52, RPU (OR OTHER AS SPECIFIED) AND EPOXY LINED, 12.1 m STANDARD LENGTHS.				
3.43	BSC 1(d)		Supply of pipes	m	220		
3.44	BSC 3		Unload and transport pipes on site from delivery vehicle	m	220		
3.45	BSC 5.1.1		Examine coatings for holidays	m	220		
3.46	BSC 4.2		Place pipe in trench, install and line up	m	220		
3.47	BSC 9		Steel pipe vertical, horizontal and composite bends with deflection angles as follows:				
3.47.1			For 406 mm OD pipe				
3.47.1.1			a) 2° to 15° (mitred bends)	No	1		
3.47.1.2			b) 15° to 30°	No	1		
3.47.1.3			c) 30° to 45°	No	8		
3.47.1.4			d) 45° to 60°	No	2		
3.47.1.5			e) 60° to 75°	No	2		
3.47.1.6			f) 75° to 90°	No	12		
3.47.1.7			g) 400 / 300 tapers, flanged to SANS 1123 table 1600/3.	No	2		
			THE FOLLOWING SUNDRY ITEMS:				
3.48	BSC 11.6		Supply, deliver, install, line up, drill and weld into the pipeline steel special and regular pipe sections and fittings as follows: (All tees, bends and reducers shall be made of API 5L, X52, 6mm wall thickness with compensation plates as specified.)				
	BSC 11.6		All flanges in accordance with SANS 1123, Table 1600/3, unless otherwise stated.				
3.48.1			Drawing No JW14301R-DET20 (Reservoir 1 Inlet Arrangements)				
3.48.1.1	BSC 11.6		Item 1: 400 mm ND Steel pipe, 1 050 mm long, flanged both ends	No	2		
3.48.1.2	BSC 11.6		Item 2: 400 mm ND 45° long radius gusset bend, flanged both ends	No	4		
3.48.1.3	BSC 11.6		Item 3: 400 mm ND Steel pipe, 5 540 mm long, flanged both ends	No	4		
3.48.1.4	BSC 11.6		Item 4: 400/50 mm ND reducing tee with all ends flanged	No	2		
3.48.1.5	BSC 11.6		Item 5: 400 mm ND stainless steel goose neck piece 1 950 mm long, including puddle flange (350mm) from outer end flanged to SANS 1123 table 1600/3	No	2		
3.48.1.6	BSC 11.6		Item 6: 400 mm ND stainless steel outlet diffuser pipe, 7 000 mm long with long radius gusset T-piece and bend all flanges to SANS 1123 table 1600/3	No	2		
3.48.1.7	BSC 11.2		Item 7: 50mm ND Isolation Valve(Wedge gate), PN 16	No	2		
3.48.1.8	BSC 11.3		Item 8: 50 mm ND Air Valve, PN 16	No	2		
3.48.2			Drawing No JW14301R-DET21 (Reservoir 2 Inlet Arrangements)				
TOTAL CARRIED FORWARD							

CONTRACT JW14301R Linbro Park Water Upgrade				SECTION 3: MEDIUM PRESSURE PIPELINES			
ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
3.48.2.1	BSC 11.6		Item 1: 400 mm ND Steel pipe, 1 050 mm long, flanged both ends	No	2		
3.48.2.2	BSC 11.6		Item 2: 400 mm ND 45° long radius gusset bend, flanged both ends	No	4		
3.48.2.3	BSC 11.6		Item 3: 400 mm ND Steel pipe, 3 400 mm long, flanged both ends	No	4		
3.48.2.4	BSC 11.6		Item 4: 400 mm ND Steel pipe,814 mm long, flanged both ends	No	2		
3.48.2.5	BSC 11.6		Item 5: 400 mm ND 90° long radius gusset bend, flanged both ends	No	2		
3.48.2.6	BSC 11.6		Item 6: 400/50 mm ND reducing Tee, flanged all sides	No	2		
3.48.2.7	BSC 11.2		Item 7: 400 mm ND stainless steel goose neck piece 2115mm long, flanged both ends, with puddle flange and isolating flange kit	No	2		
3.48.2.8	BSC 11.3		Item 8: 400 mm ND stainless steel outlet diffuser pipe, 7000mm long with long radius gusset T-piece and bend.	No	2		
3.48.2.9	BSC 11.2.2		Item 9: 50mm ND Isolation Valve (wedge gate), PN 16	No	2		
3.48.2.10	BSC 11.3		Item 10: 50mm ND Air Valve, PN 16	No	2		
			Overall				
3.49	BSC 11.6		Supply, install and test float control valve CLA-VAL DF1-C1 or similar, complete with 25 mm ND HDPE pipe to level control valves in level control valve chamber	No	4		
3.50	BSC 15.5		Water tightness and structural strength test of completed pipeline.	Sum	1		
3.51	CSC 7		Cast thrust blocks of concrete class 25 including all necessary works and operations	m³	50		
3.52	BSC 9		Steel pipe vertical, horizontal and composite bends with deflection angles as follows:				
3.52.1			For between 400mm to 550mm OD pipe				
3.52.1.1			a) 30° to 45°	No	2		
3.52.1.2			b) 45° to 60°	No	2		
3.52.1.3	BSC7.1.1		400mm to 550mm ND gusset T-piece, branch flanged to SANS 1123, Table 4000/3 , including blank flange (epoxy coated), main stem plain ended	No	1		
SECTION3: TOTAL CARRIED FORWARD TO SUMMARY							

ITEM No.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
SECTION 4: PIPE JACKING							
4.1	SANS 1200LG		PIPE JACKING Total number of jacking operations: 2. Total length of pipes to be jacked: 110m. Maximum depth of jacked pipe invert: 1,5m. See Dwg JW14301R-DET07				
	PSLG 8.2.1		Jacking establishment				
4.1.1			a) Fixed charges (based on 2 jacking operations)	sum	1		
4.1.2			b) Time-related items (based on 110 m of jacking)	sum	1		
4.1.3		SC	c) Contractor to specify duration to complete jacking operations	days			
	8.2.2		Supply of pipe to be jacked				
4.1.4			a) 1650 mm ND Class 100 D SC concrete pipes with rubber ring joints	m	110		
	8.2.3		Jacking pipes into their final position				
4.1.5			a) 1650 mm ND Class 100 D SC concrete pipes with rubber ring joints	m	110		
	8.2.4		Excavation for jacking Excavate for pipes at the jacking face (including removal and disposal of excavated material)				
4.1.6			a) Soft soil	m ³	180		
4.1.7			b) intermediate soil	m ³	180		
4.1.8			c) hard pickable soil	m ³	180		
4.1.9			e) very hard material occurring in bulk requiring extraordinary techniques for breaking, or boulders	m ³	180		
4.1.10	8.2.5		Extra-over 8.2.1 and 8.2.4 for unforeseen rock or boulders	Prov Sum	1	R 408,100.00	R 408,100.00
	8.2.9		Grouting of voids where ordered				
4.1.11			a) provision for establishment (for a total of two jackings	sum	1		
4.1.12			b) operation of equipment	day	10		
4.1.13			c) materials used	m ³	5		
4.1.14	8.2.10		Standing time for pipe jacking gang complete with equipment	hours	80		
4.1.15	PSLG 8.2.11		Installation of 1100mm ND Steel Pipe in Sleeve	m	110		
4.1.16	PSLG 8.2.12		Grouting of annulus between pipe and sleeve	m ³	15		
SECTION 4: TOTAL CARRIED FORWARD TO SUMMARY							

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Linbro Park Water Upgrade

			SECTION 5: BUILDINGS AND FENCING			
ITEM NO.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	AMOUNT
5			SECTION 5: BUILDINGS AND FENCING			
			CONSTRUCTION OF THE FOLLOWING STRUCTURES TO BE AS PER ITEMISED BILL			
5.1			Pressure reduction valve chambers as per drawings JW14301R-DET17 and JW14301R-DET18			
	SANS 1200 C		EARTH WORKS			
			SITE CLEARANCE			
5.1.1	8.2.1	SC	Clear and Grub	m ²	100	
	SANS 1200 DA		EARTH WORKS (SMALL WORKS)			
5.2	8.3		Excavation:			
5.2.1	8.3.1	SC	a) Remove topsoil to nominal depth of 150 mm, stockpile and maintain	m ²	70	
5.2.2		SC	b) Excavate in all materials, and use for embankment or backfill or dispose, as ordered.	m ³	230	
5.2.3		SC	c) Extra-over for: 1) Intermediate excavation	m ³	60	
5.2.4		SC	2) Hard rock excavation	m ³	10	
	8.3.2		Restricted Excavation			
5.3		SC	a) Excavate for restricted foundations, footings and trenches in all materials and use for backfill or embankment or dispose	m ³	10	
	SANS 1200 G		CONCRETE (STRUCTURAL)			
5.4	8.2		Scheduled formwork items			
	8.2.1		Rough			
5.4.1		SC	Outside walls	m ²	70	
	8.2.2		Smooth			
5.4.2		SC	Horizontal to under side of the roof slab	m ²	60	
			Inside walls			
5.5	8.2.5		Narrow Widths (up to 200 mm wide):			
5.5.1		SC	a) Sides of roof slab and overhang including drip recess	m	27	
5.5.2		SC	c) Sides of Concrete Surround	m	15	
5.6	8.2.6		Box Out Holes / Form Voids			
5.6.1		SC	a) Small, circular, of diameter up to and including 0,35 m 4) 1.5 m up to and including 2.0 m deep	No	1	
5.6.2		SC	c) Large, circular, of diameter over 0.35 m up to and including 0,7 m 4) 1.5 m up to and including 2.0 m deep	No	4	
	8.3		SCHEDULED REINFORCEMENT ITEMS:			
5.7	8.3.1	SC	High tensile steel bars (provisional)	t	4	
	8.4		SCHEDULED CONCRETE ITEMS			
	8.4.2		Blinding layer			
5.8		SC	50 mm blinding layer thickness Class 15/19	m ³	4	
5.9	8.4.3		Strength Concrete:			
5.9.1		SC	a) Grade 25/19 concrete for aprons	m ³	1	
TOTAL CARRIED FORWARD						

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Linbro Park Water Upgrade

				SECTION 5: BUILDINGS AND FENCING			
ITEM NO.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD							
5.9.2		SC	b) Grade 25/19 concrete for floor slabs	m³	12		
5.9.3		SC	c) Grade 25/19 concrete in roof slab	m³	10		
5.9.4		SC	d) Grade 25/19 concrete for ramps	m³	5		
5.9.5		SC	e) Grade 25/19 concrete for walls	m³	20		
5.10	8.4.4		Unformed surface finishes:				
			b) Steel-floated finish				
5.10.1		SC	Top of roof	m²	38		
5.10.2		SC	Floor Slab	m²	26		
5.11			JOINTS				
5.11.1	8.5	SC	Slip joint between wall and roof slab	m	5		
			Installation of two layers of three ply malthoid				
5.12	CSC 5		Brickwork				
5.12.1	CSC 5.1	SC	Brick walls (double brick wall)	m²	69		
5.12.2	CSC 5.2	SC	Brick reinforcement	m	354		
5.13	PSG 8.1.4		METAL WORK				
5.13.1	PSG 8.1.4.1	SC	Door	No	3		
5.13.2	PSG 8.1.4.2	SC	Crawl Beam	No	2		
5.13.3	PSG 8.1.4.3	SC	Crawl Beam Support	No	2		
5.13.4	PSG 8.1.4.4	SC	Windows	No	10		
5.13.5	PSG 8.1.4.5	SC	Steel Staircase	No	1		
			Reservoir control valve building, as per drawings JW14301R-DET17 and JW14301R-DET19				
			EARTH WORKS				
5.14	SANS 1200 C		SITE CLEARANCE				
5.14.1	8.2.1	SC	Clear and Grub	m²	105		
	SANS 1200 DA		EARTH WORKS (SMALL WORKS)				
5.15	8.3		Excavation:				
5.15.1	8.3.1	SC	a) Remove topsoil to nominal depth of 150 mm, stockpile and maintain	m²	105		
5.15.2		SC	b) Excavate in all materials, and use for embankment or backfill or dispose, as ordered.	m³	340		
5.15.3			c) Extra-over for:				
5.15.3.1		SC	1) Intermediate excavation	m³	84		
5.15.3.2		SC	2) Hard rock excavation	m³	10		
5.16	8.3.2		Restricted Excavation				
5.16.1		SC	a) Excavate for restricted foundations, footings and trenches in all materials and use for backfill or embankment or dispose	m³	10		
TOTAL CARRIED FORWARD							

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Linbro Park Water Upgrade

ITEM NO.		PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD								
5.17	SANS 1200 G	8.2		CONCRETE (STRUCTURAL)				
				Scheduled formwork items				
5.17.1		8.2.1	SC	Rough Outside walls	m ²	90		
5.17.2		8.2.2	SC	Smooth Horizontal to under side of the roof slab Inside walls	m ²	80		
5.18		8.2.5		Narrow Widths (up to 200 mm wide):				
5.18.1			SC	a) Sides of roof slab and overhang including drip recess	m	35		
5.18.2			SC	c) Sides of Concrete Surround	m	10		
5.19		8.2.6		Box Out Holes / Form Voids				
5.19.1			SC	a) Small, circular, of diameter up to and including 0,35 m 4) 1.5 m up to and including 2.0 m deep	No	4		
5.19.2			SC	c) Large, circular, of diameter over 0.35 m up to and including 0,7 m 4) 1.5 m up to and including 2.0 m deep	No	4		
5.20		8.3		SCHEDULED REINFORCEMENT ITEMS:				
5.20.1		8.3.1	SC	High tensile steel bars (provisional)	t	6		
		8.4		SCHEDULED CONCRETE ITEMS				
		8.4.2		Blinding layer				
5.21			SC	50 mm blinding layer thickness Class 15/19	m ³	6		
5.22		8.4.3		Strength Concrete:				
5.22.1			SC	a) Grade 25/19 concrete for aprons	m ³	1		
5.22.2			SC	b) Grade 25/19 concrete for floor slabs	m ³	20		
5.22.3			SC	c) Grade 25/19 concrete in roof slab	m ³	15		
5.22.4			SC	d) Grade 25/19 concrete for ramps	m ³	1		
5.22.5			SC	e) Grade 25/19 concrete for walls	m ³	25		
		8.4.4		Unformed surface finishes:				
5.23			SC	b) Steel-floated finish Top of roof	m ²	65		
5.24			SC	Floor Slab	m ²	50		
			SC	JOINTS				
5.25		8.5	SC	Slip joint between wall and roof slab Installation of two layers of three ply malthoid	m	10		
		CSC 5		Brickwork				
5.26		CSC 5.1	SC	Brick walls (double brick wall)	m ²	90		
5.27		CSC 5.2	SC	Brick reinforcement	m	625		
5.28		PSG 8.1.2.4	SC	Lintels above doors and windows	m	5		
TOTAL CARRIED FORWARD								

CONTRACT JW14301R

Linbro Park Water Upgrade

SECTION 5: BUILDINGS AND FENCING			ITEM NO.	PAYMENT REFERS	SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD										
5.29	PSG 8.1.4					METAL WORK				
5.29.1	PSG 8.1.4.1	SC				Door	No	2		
5.29.2	PSG 8.1.4.2	SC				Crawl Beam	No	2		
5.29.3	PSG 8.1.4.3	SC				Crawl Beam Support	No	2		
5.29.4	PSG 8.1.4.4	SC				Windows	No	10		
5.29.5	PSG 8.1.4.5	SC				Steel Staircase	No	2		
						Guardhouse Building, as per Drawing JW14301R-DET05				
						EARTH WORKS				
	SANS 1200 C					SITE CLEARANCE				
5.30	8.2.1	SC				Clear and Grub	m ²	50		
	SANS 1200 DA					EARTH WORKS (SMALL WORKS)				
	8.3					Excavation:				
5.31	8.3.1	SC				a) Remove topsoil to nominal depth of 150 mm, stockpile and maintain	m ²	50		
	SANS 1200 G					CONCRETE (STRUCTURAL)				
	8.2					Scheduled formwork items				
5.32	8.2.5					Narrow Widths (up to 200 mm wide):				
5.32.1		SC				a) Sides of roof slab and overhang including drip recess	m	15		
5.32.2		SC				c) Sides of Concrete Surround	m	25		
	8.4					SCHEDULED CONCRETE ITEMS				
	8.4.2					Blinding layer				
5.33		SC				50 mm blinding layer thickness Class 15/19	m ³	5		
5.34	8.4.3					Strength Concrete:				
5.34.1		SC				a) Grade 25/19 concrete for aprons	m ³	5		
5.34.2		SC				b) Grade 25/19 concrete for floor slabs and strip footing	m ³	5		
5.34.3		SC				c) Grade 25/19 concrete in roof slab	m ³	5		
5.34.4		SC				d) Grade 25/19 concrete for ramps	m ³	1		
5.34.5		SC				e) Grade 25/19 concrete for walls	m ³	1		
	8.4.4					Unformed surface finishes:				
5.35		SC				b) Steel-floated finish	m ²	15		
						Top of roof				
5.36		SC				Floor Slab	m ²	10		
						JOINTS				
5.37	8.5	SC				Slip joint between wall and roof slab	m	5		
						Installation of two layers of three ply malthoid				
TOTAL CARRIED FORWARD										

CONTRACT JW14301R

Linbro Park Water Upgrade

ITEM NO. PAYMENT REFERS			SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD								
	CSC 5			Brickwork				
5.38	CSC 5.1	SC		Brick walls (double brick wall)	m ²	50		
5.39	CSC 5.2	SC		Brick reinforcement	m	125		
5.40	PSG 8.1.4.4	SC		Lintels above doors and windows	m	10		
	PSG 8.1.4			METAL WORK				
5.41	PSG 8.1.4.1	SC		Door	No	2		
	SANS 1200 DB			Potable Water Pipeline to Guardhouse				
	8.3.2			EARTHWORKS (PIPE TRENCHES)				
				a) Excavate in all materials for trenches, backfill compact and dispose of surplus material				
				Pipes with OD up to 25 mm ND				
				Excavation depth:				
				over and up to				
5.42		SC		0 m 1.0 m	m	100		
	SANS 1200 L			MEDIUM-PRESSURE PIPELINES				
	8.2.1			Supply, Lay, and Bed Pipes Complete with Couplings				
5.43		SC		DN 25 mm HDPE PE 100 PN 16	m	50		
5.44	8.2.2	SC		Extra-over 8.2.1 for the Supplying, Laying and Bedding of Specials Complete with Couplings	No	10		
	SANS 1200 LB			BEDDING (PIPES)				
5.45	8.2.1			Provision of bedding from Trench Excavation				
5.45.1		SC		a) Selected granular material	m ³	50		
5.45.2		SC		b) Selected fill material	m ³	10		
	SANS 1200 DB			Sewer Pipeline to Guardhouse				
	8.3.2			EARTHWORKS (PIPE TRENCHES)				
				a) Excavate in all materials for trenches, backfill compact and dispose of surplus material				
				Pipes with OD up to 110 mm ND				
				Excavation depth:				
				over and up to				
5.46		SC		0 m 1.0 m	m	100		
5.47	SANS 1200 LB			BEDDING (PIPES)				
5.47.1	8.2.1	SC		a) Selected granular material	m ³	20		
5.47.2		SC		b) Selected fill material	m ³	20		
	SANS 1200 LD			SEWERS				
5.48	8.2.1	SC		Supply, Lay, Joint, Bed (Class 16) and test pipeline	m	100		
	8.2.2	SC		Extra-over 8.2.1 for Specials	m	100		
5.49								
5.50	PSA 8.8.7	SC		Application for Water connenction	Sum	1		
5.51	PSA 8.8.7	SC		Application for Sewer connenction	Sum	1		
TOTAL CARRIED FORWARD								

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Linbro Park Water Upgrade

ITEM NO. PAYMENT REFERS			SC	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
BROUGHT FORWARD								
5.52	PSA 8.8.7		SC	Application for Electrical connenction	Sum	1		
5.53			SC	Electrical installation as per note in Drawing JW14301 - DET05	Sum	1		
5.54			SC	Supply + Lay of cable. 3 Core Armoured Cable 4.0 mm² + Trench + Backfill	m	100		
5.55			SC	Connection to Guardhouse Switchbox including electrical compliceance certificate	Sum	1		
5.56			SC	Sanitary fitting Supplied and Installed as per notes in drawing JW14301R - DET05	Sum	1		
				FENCING				
	SANS1200 C			SITE CLEARANCE				
5.57	8.2.5(a)		SC	Take down existing concrete pallisade fence and transport material to nearest Johannesburg Water depot	km	0.570		
5.58	8.2.5(b)		SC	Take down existing concrete precast wall and transport material to nearest Johannesburg Water depot	km	0.250		
5.59	8.2.5		SC	Take down existing "Clearvu" taper locking posts and pannels and reinstall later at the instruction of the engineer.	km	0.300		
				SUPPLY AND ERECTION OF NEW FENCE				
5.60	ASC 19.1		SC	"Clearvu" taper locking posts, 85x45mm, including locking recess mechanism, Galvanised. Post extended for flatwrap. Including excavation, concrete and backfilling.	No	250		
5.61	ASC 19.1		SC	"Clearvu" panels, 3,3m x 2,4m, 76,2mmx12,7mm apperture size, panel reinforced with 4x50mm "V" formation horisontal recess bands	No	246		
5.62	ASC 19.1		SC	Ripper flatwrap, 500mm diameter	m	570		
5.63	ASC 19.1		SC	"Clearvu" underdig anti-burrow, 500mm deep, including excavation and backfilling	m	570		
5.64	ASC 19.1		SC	6,51m Wide "Clearvu" sliding gate, 2,4 m high including heavy duty sliding rail and Flatwrap topping, 3mm dai galvanised wire with aperture size 76.2 x 12.7mm	No	1		
5.65	ASC 19.1		SC	6,51m x 600mm x 300mm Concrete beam (including excavation, backfilling, formwork, reinforcement and rail)	Sum	1		
SECTION 5: TOTAL CARRIED FORWARD TO SUMMARY								

Volume	1	2	3	4		
Part	T1	T2	C1	C2	C3	C4



Contract JW14301R
 Linbro Water Upgrade
Part 2: Pricing Data

SUMMARY OF BILL OF QUANTITIES

SUMMARY OF BILL OF QUANTITIES	
DESCRIPTION	AMOUNT
SECTION 1: PRELIMINARY AND GENERAL	R
SECTION 2: EARTHWORKS (PIPE TRENCHES)	R
SECTION 3: PIPELINES	R
SECTION 4: PIPE JACKING	R
SECTION 5: BUILDINGS AND FENCING	R
SUB-TOTAL A	R
Plus 10% for Escalation (Compulsory)	R
SUB-TOTAL B	R
Plus 10% for Contingencies (Compulsory)	R
SUB-TOTAL C	R
PLUS 15% VAT	R
TENDER SUM CARRIED TO FORM OF OFFER	R

Employer:		Contractor:	
Witness:		Witness:	



Johannesburg Water SOC Ltd



LINBRO WATER UPGRADE

VOLUME 2

CONTRACT

PART 3:

SCOPE OF WORK

Employer:		Contractor:	
Witness:		Witness:	



C3 PREAMBLE TO SCOPE OF WORK

GENERAL

This section specifies and describes the supplies, services and Employer's Agent and construction works which are to be provided and any other requirements and constraints relating to the manner in which the contract work is to be performed.

SCOPE

These Project Specifications are set out in three portions:

- Portion A: covers a general description of the project, the facilities available and the requirements to be met.
- Portion B: covers variations to the standardised specifications, which are applicable to the contract.
- Portion C: covers particular specifications, which are applicable to all pipe diameters of 400 mm and larger on this contract.

STATUS

The Project Specifications together with the drawings and Schedule of Quantity indicate the section of Standard Specification applicable to this Contract.

In the event of any discrepancy between parts of the Standard Specification and the Project Specifications, the latter shall take precedence and shall govern.

Should any requirement of the Particular Project Specification conflict with any requirement of the Project Specification or Variations and Additions to the Standardised Specifications, the requirements of the Particular Project Specifications shall prevail.

Employer:		Contractor:	
Witness:		Witness:	



Contents

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PS 1.3	Extent of the Works
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Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14301R
LINBRO WATER UPGRADE
Volume 2
Part 3: Scope of Work



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Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14301R
LINBRO WATER UPGRADE
Volume 2
Part 3: Scope of Work



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Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14301R
LINBRO WATER UPGRADE
Volume 2
Part 3: Scope of Work



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Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14301R
LINBRO WATER UPGRADE
Volume 2
Part 3: Scope of Work



Clause	Description
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Employer:		Contractor:	
Witness:		Witness:	



Contract: JW14301R
LINBRO WATER UPGRADE
Volume 2
Part 3: Scope of Work



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PSLG	PIPE JACKING
PSLG 8	MEASUREMENT AND PAYMENT
PSLC 8.2	Scheduled Items
PSSC	SUB-CONTRACTORS
PSSC 1	Value of Sub-Contracted Work
PSSC 2	Overhead, charges and profit fee for the Main Contractor to oversee sub-contracted works

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Clause	Description
PSSC 3	Fixed-charged items for the sub-contractors Contractual requirements
PSSC 4	Overhead, charges and profit for the Main Contractor to provide for fixed-charge items for the sub-contractor Contractual requirements.
PSSC 5	Time related items for the sub-contractors Contractual Requirements
PSSC 6	Overhead, charges and profit for the Main Contractor to provide for time related items for the sub-contractors Contractual Requirements
PSSC 7	Training for SMMEs
Portion C	PARTICULAR PROJECT SPECIFICATIONS
Section A	Excavation, Backfilling, etc of Pipe Trenches
Section B	Unloading, Laying, Jointing, etc of Steel Pipes, Supply and Installation of Specials and Installation of Valves
Section C	Construction of Valve Chambers, Structures, etc.
Section D	Measurement and Payment
Section X	Solvent Free Liquid Epoxy Internal Lining on steel pipelines
Section Y	Specification for Rigid Polyurethane Coating and Solvent Free Liquid Epoxy Lining on API 5L Steel Pipes
Section Z	Specification for the Fabrication, Coating and Delivery to Site of Steel Pipes
	WAYLEAVES
	DRAWINGS

Employer:		Contractor:	
Witness:		Witness:	



PORTION A: PROJECT DESCRIPTION AND GENERAL INFORMATION

PS 1 DESCRIPTION OF THE WORKS

PS 1.1 EMPLOYER'S OBJECTIVES

The primary objective of this project is to execute the works described below, while providing uninterrupted water supply to the Johannesburg Water Linbro Park and Alexandra Reservoirs and minimize water loss, and avoid damage of nearby properties. The project to be implemented has taken into cognizance the prescripts of EPWP and local SMMEs.

PS 1.2 OVERVIEW OF THE WORKS

The work to be carried out under this contract includes the installation of a steel pipeline including 688m of 1 100 mm ND, 100 m of 1 000 mm ND and 220 m 400 mm ND. Included in the project is the construction of three new air valve chambers, a new scour valve chamber, a new isolation valve chamber, a new pressure reducing valve building, a metering chamber and a new reservoir control valve building. Also included are two pipe jacks with a total combined length of 70 m.

PS 1.3 EXTENT OF THE WORKS

The primary activities of the project entail the following:

- Site clearance
- Traffic control and temporary signage during construction
- Location, exposing and protection of existing services
- Demolition of part of three security fences and the reinstatement of these fences, complete with electric fencing, after construction is complete
- Excavation, trench preparation, bedding and compaction
- Supply, unloading and laying of pipes
- Backfilling of trenches and testing of installation
- Provision and installation of valves and chambers / buildings
- Reinstatement of surfaces to original condition
- Connections into existing pipes
- Connections into existing reservoirs
- Pipe Jacking
- Replacing the existing palisade fence around the reservoir complex
- Construction of a new guardhouse at the reservoir complex

The following table contains the details of the pipes to be supplied by the Contractor. Steel pipes and fittings shall be manufactured in accordance with API 5L X52 and all pipes will have an internal lining of SF Epoxy and an external coating of Rigid Polyurethane.

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Length (m)	Pipe ND (mm)	Pipe ID (mm)	Pipe OD (mm)	Wall thickness (mm)	Pipe lengths (m)	Number of pipes
688	1 100	1 094	1 118	12	12.192	56
100	1 000	996	1 016	12	12.192	9
220	400	394	406	6	12.192	19

Johannesburg Water will appoint a separate consultant to provide third party inspections at the pipe manufacturer's premises, including:

- Exercising of quality control at the manufacturer's site during the manufacture of the pipes;
- Review the manufacturer's quality standards;
- Accept / approve the release of each pipe from the factory.

Included in the works is the demolition and subsequent reinstatement of two portions of steel palisade fence, belonging to a private landowner. Both sections of fence to be demolished and reinstated cross the proposed pipe-route. Also included is the demolition and disposal of the existing concrete palisade fence around the reservoir complex, and the replacement thereof with a new Clearview (or similar approved) fence.

The contractor shall reinstate these fences to their original conditions or better, complete with electric fences to the satisfaction of the owners. While the walls are demolished, the Contractor shall arrange for additional security to the satisfaction of the private landowner and Johannesburg Water.

Also included is the construction of a new guardhouse. The Contractor shall also locate water, sewer and electricity connections for the new guardhouse and arrange for metered connections with the relevant authorities.

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

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

PS 1.4 LOCATIONS OF THE WORKS

The works are located in Linbro Park, Johannesburg. The proposed pipe-route will run alongside Clifford Road (a portion of which has been abandoned) and through the property of UTi, a private landowner. The proposed pipe-route then crosses Clulee

Employer:		Contractor:	
Witness:		Witness:	



Road and enters the Linbro Park / Alexandra Reservoir Complex (LPARC). Refer to the locality plan included in the set of drawings.

PS 1.5 TEMPORARY WORKS

The Contractor shall, as relevant:

- a) provide temporary drainage works, temporary pumps and other equipment as might be necessary for the protection, draining and dewatering of the works; and
- b) construct and maintain haulage, temporary access and construction roads, subject to the approval of the Employer, and permit the Employer, other Contractors, statutory bodies or any other person who might require legitimate access to or through the site for the purpose of executing legitimate business, free and unhindered usage of such roads.
- c) temporary water connections, Contractor's offices, storage sheds, latrines, barricading of Works shall be located in an approved position and subject to the approval of all authorities concerned. Access to a portion of the project site will be via the UTi premises. The Contractor must arrange for access to the entire project site. The Contractor must arrange for the establishment of a Contractor's camp on site.
- d) Safety and security of the Contractors' temporary works shall be at the Contractors' discretion, but always in accordance with stipulated Occupational Health and Safety requirements. The Contractor shall also liaise with UTi, and other affected property owners in the area, to ensure that the security requirements of these owners are met.
- e) The camp shall be adequately guarded during or outside working hours.
- f) The costs for all above activities shall be deemed to be included in the rates.

PS 2 EMPLOYER'S AGENT

PS 2.1 EMPLOYER'S DESIGN

The Contractor undertakes only construction on the basis of designs issued by the Employer's Agent. The Contractor is to follow the specifications, the design and construction drawings as laid out by the Employer's Agent. 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.

Employer:		Contractor:	
Witness:		Witness:	



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

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

Construction drawings will be issued to the successful tenderer, prior to commencement of construction.

Drawings include:

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

Upon receiving the instruction to commence with construction, the Contractor shall receive 3 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.

PS3 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 SUBCONTRACTING

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.

Employer:		Contractor:	
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2. Small Enterprises

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

3. Micro Enterprises

An enterprise that has a CIDB grading designation of 3.

4. Locally based SMMEs

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

5. Contract Participation

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

6. Contract Participation Goal (CPG)

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

7. Contract Participation Performance (CPP)

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

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

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 (3rd Edition).

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;

Employer:		Contractor:	
Witness:		Witness:	



- Construction Industry Development Board Act No. 38 of 2000;
- Broad-Based Black Economic Empowerment Act No. 53 of 2003.

PS.3.2.3 Scope of Work

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 subcontracting percentage of the contract value is indicated in the Contract Data, the contractor may increase this percentage at his discretion.

Some specialized work could be subcontracted, including CP and AC Mitigation installations and pipe jacking. The Contractor must take note of Clause 4.4 of General Conditions of Contract 2015 (3rd Edition).

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 **SMMEs** equal to the subcontracting percentage of the Contract Sum indicated on the Contract Data.

The minimum requirements of the sub-contractors are as follows:

1. Valid CK registration
2. SA ID copies of owners
3. Active CIDB membership
4. Valid Tax clearance certificate
5. Valid BBBEE certificate
6. COID certificate
7. Company Profile including similar experience and skilled personnel CVs
8. Health and Safety Plan

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

1. The Contractor shall subcontract the local SMME works at the Provisional Sum items allocated for the sections of work in Section 1 of the Bill of Quantities.
2. The Contractor will be expected to have clearly specified the programme dates to the SMME and these dates are to be included in the contractual agreement between the two parties. The Contractor is to monitor the SMME's progress against the programme and hold progress meetings with the SMME contractors where minutes are to be kept and signed off by both parties.

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

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11. Together with their tenders, all Contractors are required to submit a comprehensive implementation plan clearly stating the labour content and number of jobs that shall be created. The employment of labour shall be reflected in a programme in sufficient details to enable the Project Manager to monitor and compare it with the implementation plan.
12. The Contractor shall be required to submit employment data on a monthly basis to the Employer's Agent.
13. Contractors are to also note that it is an explicit condition of this Contract that all unskilled labourers on the project are to be employed from the local community. The Contractor shall, in general, maximise the involvement of the local community.

PS.3.2.4 RETENTION MONIES

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

PS.3.2.5 RESOLUTION OF DISPUTES

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

Employer:		Contractor:	
Witness:		Witness:	



PS4 CONSTRUCTION

PS 4.1 GENERAL CONDITIONS AND APPLICABLE STANDARDS

PS 4.1.1 General Conditions

The “Special Condition of Contract” to be read in conjunction with the “General Conditions of Contract for use Civil Engineering Works (GCC 2015, Third Edition).

PS 4.1.2 Applicable Standardized Specifications

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

SANS 1200A	:	GENERAL
SANS 1200AB	:	EMPLOYER'S AGENT 'S OFFICE
SANS 1200C	:	SITE CLEARANCE
SANS 1200D	:	EARTHWORKS
SANS 1200DB	:	EARTHWORKS (PIPE TRENCHES)
SANS 1200G	:	CONCRETE (STRUCTURAL)
SANS 1200L	:	MEDIUM PRESSURE PIPELINES
SANS 1200 LB	:	BEDDING (PIPES)
SANS 1200 LD	:	SEWERS
SANS 1200 LF	:	ERF CONNECTION (WATER)
SANS 1200 LG	:	PIPE JACKING

Unless and to the extent that it is otherwise stated in the Contract Data, the scope of work or the specifications, the Contractor shall carry out the actions and arrange for the facilities as described in part 1 of SANS 1921, not extend his operations beyond the site.

Reference is made to certain provisions of:

SANS 1921-5 Construction and management requirements for works contracts:

Earthworks activities which are to be performed by hand

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

All the above specifications are not issued with this volume but are available at the Contractor's expense from: Standards South Africa,

Office Address:	Postal Address:	Telephone:	Telefax	Email:
1 Dr Lategan Road Groenkloof PRETORIA	Private Bag X191 PRETORIA 0001	(012) 428-6883	(012) 428-6928	sales@sabs.co.za

Employer:		Contractor:	
Witness:		Witness:	



PS 4.1.3 Other Standards

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

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

PS 4.2 PLANT AND EQUIPMENT

Where any of the operations or the movement of any of the construction vehicles or mobile construction equipment, or any combination of these activities, causes damage to the surface of an area normally open to the public, such surface shall be repaired as a matter of urgency.

Construction equipment shall be suitable for the production of the end result required under the conditions applicable to the site.

The construction equipment used for applying the dynamic load, controlling the moisture content, and grading or mixing, shall be capable of achieving the specified compaction with the materials available for the construction of the works.

The Contractor shall ensure that adequate equipment is available for the entire construction operation. In case of pipes, this shall include equipment for pipe cleaning, pressure testing of the newly laid water main.

The Contractor shall provide the following plant and equipment on the site as and when required, together with operating personnel:

- a) trucks for the transportation of materials from storage site to construction site and back;
- b) road traffic signs, materials for barricading and lighting and all other items necessary for ensuring public safety and convenience. The Contractor shall furnish all labour required for the erection, maintenance and removal of these items and materials;
- c) mechanical and power tools, when ordered to do so by the Employer's Agent;
- d) hand tools and equipment such as shovels, picks, etc, which may, in the opinion of the Employer's Agent, be required for the execution of the works;
- e) forms for the casting of cast-in-situ concrete for anchor blocks. The Contractor shall supply all labour required for the erection, stripping and cleaning of forms; and
- f) any other plant and equipment deemed necessary for the execution of the Works

Employer:		Contractor:	
Witness:		Witness:	



Unless otherwise indicated in the Contract Documents, the Contractor shall provide all such plant and equipment complete with operating personnel, fuel and power as required.

If the Contractor fails, in the opinion of the Employer's Agent due to his own negligence, to enable the plant or equipment to be efficiently or fully utilised, the costs of under-utilisation of plant or equipment shall be borne by the Contractor to the extent determined by the Employer's Agent .

If a vehicle or item of construction equipment is required to operate on any public highway, road or street or on any private road or parking area that has been surfaced, it shall comply with the requirements of the applicable road traffic ordinance.

PS 4.3 ENGAGEMENT OF LABOUR

PS 4.3.1 Provision of a Temporary Workforce for the Contract

The Contractor shall have regard for the stipulation laid down for all Labour-Intensive projects that he employs labour from the local community through the Labour Desk that has been established for this purpose.

The Labour Desk shall assist in identifying available local labour and, where available, semi-skilled labour as well as local sub-Contractors. The Labour Desk shall also assist and advise regarding conditions of employment, minimum wages, disputes and disciplinary procedures.

The workforce that is employed on Site shall consist of local labour where applicable, except for approved key staff, to the extent that is compatible with the requirements of Clause 4.11 of the General Conditions of Contract 2015 (3rd Edition).

The Occupational Health and Safety Act must be adhered to with reference to the safety of any employee irrespective of whether such employee is employed by the Contractor or by a local sub-contractor. Furthermore, a contract of employment must be signed between the Contractor and each of his employees and sub-contractors and between such sub-Contractors, and each of the sub-contractor's employees with clear reference to the following conditions:

- The minimum agreed wage rate per hour in respect of labourers;
- The agreed pay rate per unit of production where applicable;
- UIF and WCA payments;
- Minimum working hours per day;
- Start and end times of a daily shift;
- Lunch break times;

Company Policy regarding the following:

- Rain time
- No work no pay - sick, absent
- Disciplinary policy

Employer:		Contractor:	
Witness:		Witness:	



- Grievance policy
- Method of payment
- Workers' clothing and safety equipment to be issued.
- The Contractor is required to show these items to the Employer's representative for approval before construction commences.

PS 4.3.2 Transportation of labourers

The labour employed on this contract shall be local labour from the nearest local community. Transportation should be arranged from their homes to the site.

PS 4.4 EXISTING SERVICES

The Contractor shall make himself acquainted with all existing services such as stormwater drains, water mains, power lines, cables, gas pipelines, telephone and lighting poles, water meters, stopcock boxes, valve boxes, hydrants, air mains, trees, sewers, etc. before any excavation commences. Special care and due diligence shall be exercised when working adjacent to the abovementioned existing services. **Under no circumstance is the Contractor to alter or in any way interfere with existing works or underground services unless authorised by the Employer's Agent.**

Where, in the opinion of the Employer's Agent and if ordered by him, there is sufficient uncertainty as to the existence of, or the position or depth of any underground services, the Contractor shall first make use of specialist equipment such as ground penetrating radar before carrying out exploratory excavations using hand tools, in order to obtain the required information without causing damage. Exploratory excavations shall be carried out, refilled and reinstated in an approved manner as expeditiously as possible. Where existing works are of such a nature that the Employer's Agent may require them to be moved by the Contractor, the cost of such work will be paid for at scheduled rates or on a Day works basis.

The Contractor shall take adequate measures approved by the Employer's Agent to protect and prevent damage to existing works and services. The Contractor shall immediately notify the Depot Manager as well as the Employer's Agent, of any damage caused to existing works and services. All cables and pipes shall be considered "live" unless confirmed otherwise by the relevant service authority.

PS 4.5 SITE ESTABLISHMENT, FACILITIES AVAILABLE AND REQUIRED

The Contractor shall be required to establish all facilities, including, as necessary, construction camps, offices, stores, workshops and testing facilities required for the due and proper performance of the contract in the vicinity of the Works. The Employer will not provide any facilities to the Contractor. The Contractor shall make his own arrangements for a campsite with the relevant authorities.

The Contractor shall supply and maintain adequate and suitable sheds for the storage of materials that might deteriorate if exposed to the weather.

The Contractor shall, as specified in the specification data, provide, maintain and keep clean

- a) office accommodation and equipment for use by the Employer and his agents,

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Witness:		Witness:	



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- b) air-conditioned boardroom for site meetings, and
- c) all other facilities for all persons engaged in the works.

The Contractor shall provide and maintain all first-aid facilities required by law.

The Contractor shall provide, maintain, move to positions required and finally remove, proper latrines in compliance with the relevant Municipal Sanitation General By-laws. Latrines must be properly screened and secluded from public view and their use shall be strictly enforced. The Contractor shall provide chemical toilets (or other approved toilets). Soak-aways and septic tanks will not be allowed on the site. Temporary latrines must be sited so that they are within reasonable distance of the working place. Sufficient latrines must be provided having regard to the number of persons employed on the Works. All latrines shall be adequately ventilated, properly disinfected and kept in a clean condition.

At the time of erecting the sheds and offices, the Contractor shall erect on or adjacent to the site, in a conspicuous place to be agreed upon by the Employer's Agent, contract name board as detailed in PSAB 3.1

On completion of the works, or when the facilities provided by the Contractor are no longer required, the Contractor shall remove them and clear away all surface indications of their presence.

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

The Contractor will be required to obtain a cellular telephone for his own and Employer's Agent's representative's use on the site.

Employer:		Contractor:	
Witness:		Witness:	



PS 4.6 SITE USAGE

The Employer may make available, as part of or by reference in the Tender Documents, site data relating to hydrological and subsurface conditions relevant to the construction of the Works. The Employer does not guarantee that such site data is fully representative of

- a) all information (as far as practicable) as to risks, contingencies and all other circumstances which may influence or affect the Tender
- b) all conditions that may be encountered by the Contractor during the execution of the Works.

Should the Employer have carried out exploratory drilling and have available the borehole cores derived from such drilling, the Tenderer shall examine such borehole cores and any related data at the place and time notified to the Tenderer.

The Tenderer shall visit the Site of the Works and shall satisfy himself as to the means of access and all matters affecting the Works, including the extent to which mechanical plant can be used for executing the Works.

Visits to the site shall be at the sole risk of the Tenderer and the Employer shall not be liable for any loss or damage to persons or property as a result of or arising from the site inspection.

PS 4.7 PERMITS AND WAYLEAVES

The Employer's Agent has obtained some of the wayleaves from identified authorities. The authorities include the following services: roads and stormwater (JRA), bulk water supply (Rand Water), electricity (Eskom and City Power), gas (Egoli Gas), telecommunications (Telkom), and the like. See item PSA 8.8.7.

PS 4.8 ALTERATIONS, ADDITIONS, EXTENSIONS AND MODIFICATIONS TO EXISTING WORKS

The Contractor shall, within 20 working days or 10 % of the construction period after taking possession of the site (whichever is the lesser), satisfy himself that the dimensional accuracy, alignment, levels and setting out of existing structures or components thereof are compatible with the proposed works, and notify the Employer of any areas of dissatisfaction.

The Contractor shall, on becoming aware of a defect in existing works which will have an impact on the current works, notify the Employer of such a defect without delay.

The water mains of the existing network would have to be modified slightly to facilitate the connection of the new water main installation.

PS 4.9 INSPECTION OF ADJOINING STRUCTURES, SERVICES, BUILDINGS AND PROPERTIES

Employer:		Contractor:	
Witness:		Witness:	



The Contractor shall, before commencing with works which have the potential to damage surrounding structures, services, buildings or property, arrange an inspection with the owners of such structures, services, buildings and property and representatives of local or controlling authorities, as appropriate, to determine the condition of buildings, structures, services, paved surfaces, roads, kerbs, perimeter walls, channels and the like, that the works could affect, and document their current condition in sufficient detail to enable disturbances or damage which might be caused by the works to be evaluated. The Contractor shall furnish the Employer with copies of all such documentation and shall be held responsible for any disturbance and damage to such structures, services, buildings and property arising from the performance of the contract.

PS 4.10 WATER AND ELECTRICITY FOR CONSTRUCTION PURPOSES

The Contractor shall make his own arrangements for the supply and storage of all water required for this contract. Only sources approved by the Employer's Agent shall be used. No direct payment will be made in respect of the procurement, transporting and distributing of water, however these costs shall be deemed to be covered by the Contractor's rates for the various other items of work in this contract requiring the use of water.

The Contractor must make his own arrangements for any power he considers necessary. Should the Contractor utilise a portable power source, all electrical installations connected thereto shall comply with the provisions of the Mines, Works and Machinery Regulations and the Standard Regulations for the Wiring of Premises. No direct payment will be made to the Contractor. All costs in this respect shall be deemed to be covered by the various other items of work included under this contract.

PS 4.11 SURVEY CONTROL AND SETTING OUT OF THE WORKS

The methods of setting out employed by the Contractor shall be such that they ensure positive control.

The Contractor shall, prior to the ordering of pipe fittings, set out the works strictly according to the Employer's Agent construction drawings and/or site instructions.

The Contractor shall record the setting out of the works in an approved format and order all required pipe fittings accordingly. See item PSA 8.8.5.

Employer:		Contractor:	
Witness:		Witness:	



PS 5 MANAGEMENT OF THE WORKS

PS 5.1 PLANNING AND PROGRAMMING

The Contractor shall manage and execute works in premises that are occupied in such a way as to cause the least interference with the general routine of the occupants of these premises. The Contractor shall regularly clear away rubbish and excess materials as the works proceed and maintain the works in a clean and satisfactory state. The Contractor shall manage the works in a manner which protects and does not disturb the trees and shrubs identified in the specification data and those trees and shrubs not directly affected by the works. The Contractor shall take all necessary precautions to keep the works and site free from vermin.

No deviation from the approved sequence of construction shall be accepted without prior written approval.

The programme shall be in the form of a bar chart and shall show clearly the anticipated quantities of work to be performed each month, together with the manner in which the listed plant is to be used, as well as the cash flow for the various sections of work.

1. Sequence of the works for the relevant works area.
2. Target dates for the tasks identified in sequence of the works for the relevant works area
3. Materials requirements.
4. Construction Plant to be used.
5. Services affecting construction
6. Any factors that could affect construction progress after commencement.

The method statement shall be approved by the Employer's Agent before commencement of construction. In order to minimize the impact on traffic, pedestrians and business the Contractor will be required to segment the works in such a manner that no portion of the works is more than one day ahead of the following position i.e. trenches cannot be excavated more than one day ahead of pipe laying, pipes more than one day in advance of manhole construction and finishing off etc. These segments of the works shall be clearly defined in the Contractor's method statement for each work area.

If, during the progress of the work, the quantities of work performed per month fall below those shown on the programme, or if the sequence of operations is altered, or if the program is deviated from in any other way, the Contractor shall, within one week after being notified by the Employer's Agent, submit a revised programme.

PS 5.1.1 Planning

Employer:		Contractor:	
Witness:		Witness:	



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

PS 5.1.2 Programming

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

PS 5.1.2.1 Time Scale (minimum):

- i. Days, where the period does not exceed three months.
- ii. Weeks, where the project period exceeds three months.
- iii. Months, where the period does not exceed one year.
- iv. Years, where the project period exceeds one year

PS 5.1.2.2 Tasks:

Where phases or stages are anticipated, this shall be the highest level of division and all tasks related to the successful accomplishment of that phase of the area shall be grouped. Resources allocation and task dependency shall be indicated.

PS 5.1.2.3 Start and Finish Dates:

All tasks shall have specific start and finish dates.

PS 5.1.2.4 Critical Path:

All tasks forming the programme line that will establish any delays in the overall Contract Period shall be clearly indicated and an indication of their sensitivity characteristics shall be provided.

PS 5.1.2.5 Progress Tracking:

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

PS 5.1.2.6 Non-working Time:

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

The Contractor shall submit to the Employer's Agent for his approval a detailed programme within the period stated in the Contract Data showing the order of procedure and method in which he proposes to carry out the work, his method of measurement of progress as well as the resources that will be allocated to each item or phase of the works. On a fortnightly basis throughout the contract, the Contractor shall submit the accepted programme marked to show actual progress. Quantities proposed for execution during each month must be shown. In addition, the anticipated cash-flow for

Employer:		Contractor:	
Witness:		Witness:	



the Contract, based upon these quantities, shall be shown as per prescribed format as provided by the Employer's Agent. The Contractor must include in his programme all necessary details pertaining to the lead-time required for the supply of materials.

The Contractor shall, whenever required by the Employer's Agent, furnish for his information particulars in writing of the Contractor's arrangements for the carrying out of the works and of the plant and temporary works, which the Contractor intends to supply, use or construct as the case may be. The submission to and approval by the Employer's Agent of such programme, or the furnishing of such particulars will not relieve the Contractor of any duties or responsibilities under the contract.

The Contractor will be expected to progress with the Works in accordance with the approved programme and shall not deviate from the order of execution shown in the programme without the prior approval of the Employer's Agent or his Representative. Should such approval be given, an adjusted programme shall be produced within seven (7) days and submitted to the Employer's Agent for evaluation.

The Contractor must carry out the work at a rate not less than that stated in his programme. Should the work not be executed with the diligence and labour specified, meant and intended in and by the terms of the contract, then the Employer shall institute the remedies under Clause 9.2 of the General Conditions of Contract 2015(3rd Edition).

PS 5.2 SEQUENCES OF THE WORKS

Notwithstanding any changes that the Employer's Agent deems necessary the sequences should include the following:

- Mobilisation, project planning and control and communications to stakeholders
- Obtaining wayleaves
- Surveys and setting out
- Site clearance for the affected areas
- Traffic control and temporary signage during construction
- Exposing existing services and driveways
- Searching for services with specialised equipment
- Excavation, trench preparation and compaction
- Supply, bedding and laying of pipes
- Provision and installation of valves and chambers
- Backfilling (blanket layers and top layers including compaction)
- Trenchless installations
- Construction of valve chambers
- Reinstatement of paved and other areas where affected
- Testing of the installation
- Clearing of the site including removal of spoil
- Survey and provision of as-built information to Employer's Agent
- Site hand over

The Contractor shall obtain approval from the Employer's Agent at each stage to proceed with subsequent stages.

Employer:		Contractor:	
Witness:		Witness:	



PS 5.3 SOFTWARE APPLICATIONS FOR PROGRAMMING

The Contractor shall table an updated copy of the approved programme at each site meeting clearly indicating the actual progress versus the scheduled progress. It is recommended that MS Projects, MS Excel be used to prepare the construction programme schedule

PS 5.4 METHODS AND PROCEDURES

The Contractor shall submit to the Employer's Agent, within a period stated in the Contract Data, a detailed construction programme, detailing the date of commencement and completion of the work activities, dates, duration and extent of traffic accommodation interruption water supply to affected consumers. The detailed programme shall be based on the preliminary programme submitted with the tender and shall make an allowance for the following:

- Normal working hours shall be defined as between 07:00 and 17:30 Mondays to Fridays and also 07:00 to 13:00 on Saturdays. Working hours to be to the satisfaction of the owners of the surrounding properties, and are to be approved by the Employer's Agent.
- No work outside working hours will be allowed. Should the Contractor wish to work outside normal working hours written permission shall be obtained from the Employer's Agent and all additional costs arising out of such work shall be entirely to the Contractor's account.
- Only one side of the street may be affected by the construction at any one time.
- The Employer's Agent may require that the construction of certain road crossings be done outside normal working hours.

The Employer's Agent shall provide the Contractor with drawings and details of the Works that need to be done.

Once a detailed programme has been approved, the Contractor shall not deviate from the planned operations.

Pipeline and associated hydrants, valves and fittings

- The existing pipes will be left in place and remain operational.
- The connection of the new pipe will be done by the Contractor under strict monitoring by the Employer's Agent.
- Extreme care should be taken not to break or damage the existing pipelines. If this should happen and the existing pipe gets damaged during the course of installing the new line, then the relevant Depot Manager must be notified. The trench will have to be drained by the Contractor after the Depot has turned the water supply off. All assistance must be given by the Contractor to the Depot in repairing the damaged pipe.
- The new pipelines will be laid as indicated on the drawings supplied.

All existing erf connections are to be disconnected from the existing reticulation and then reconnected to the new pipeline with minimum disruption to residents.

Fire hydrants and valves

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- New fire hydrants, valves and fittings are to be and installed on all the new pipelines.
- After the old mains have been disconnected from the reticulation system (if applicable) all existing valves and hydrants are to be handed to the Employer.

General

- The Contractor will arrange for the warning of the public of any shutdown of supply necessary in his/her opinion for the proper execution of the Works.
- All disconnections and reconnections, connections to the existing mains, closing and opening of valves and the disruption of water supply must be liaised with the relevant Depot Manager (011) 531 9550 at least 4 working days prior to the action (but preferably more).
- The disruption of supply and the duration of disruption of the supply to the consumers are to be kept to a minimum. Consumers are to be informed of any disruptions as described later in this specification.
- Any claims from the property owners and/or the community will be considered and evaluated by the Employer. Should The Employer's find a valid claim but found that the Contractor has neglected his/hers responsibilities and/or duties, which lead to the claim, the Contractor will be responsible for settling the claim.

PS 5.5 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, levels and all compaction and hydraulic test results to indicate compliance with the scope of work.

PS 5.6 ACCOMMODATION OF TRAFFIC ON PUBLIC ROADS OCCUPIED BY THE CONTRACTOR

The Works are to be carried out in areas with mostly vehicular traffic and also pedestrian traffic. The watching, barricading, lighting and traffic control on Site shall be carried out in strict compliance with these Specifications. Furthermore, the Contractor shall ensure that pedestrians have free access past the Works without having to walk on trafficked roadways and shall make every effort necessary to ensure that construction activities cause as little inconvenience and danger to the public as possible.

The Contractor shall ensure that the use of the trafficked carriageway, both pedestrian and vehicular, by his construction plant, vehicles and labour is kept to a minimum required for the construction activities but without compromising the safety of his work force.

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Witness:		Witness:	



The Contractor shall ensure that access for residents, vehicles and pedestrians is given at all times. The tendered Sum for trench excavation shall include for the full costs associated with all provisions to ensure adequate accommodation of traffic, i.e. signage, flagmen etc., and no further costs will be approved by the Employer's Agent in this regard.

The Employer shall issue all relevant wayleaves to the successful Contractor. The Contractor shall liaise with all relevant service providers and/or authorities regarding the commencement of works and shall ensure that all wayleave conditions are adhered to.

The Contractor shall liaise with Johannesburg Roads Agency and shall ensure that all required way leaves have been obtained before works commence.

No construction shall commence prior to the Employer's Agent having approved the Contractor's proposed traffic accommodation measures and all traffic control devices having been positioned in accordance with the approved traffic accommodation measures. Approval of a particular proposed accommodation measure shall in no way relieve the Contractor of his duties or responsibilities under the Contract.

In particular, excavations must at all times be made safe such that they will not become a safety risk for the public. Trenches must not be left open overnight without sufficient barricading, lighting and watching to ensure satisfactory safety. Excavations must be kept free of water.

PS 5.7 OTHER CONTRACTORS ON SITE

The Employer's Agent shall, prior to the commencement date of the contract, determine the scope of work and the amount of work that is to be carried out by the nominated sub-Contractor(s). If applicable, the Contractor shall be expected to enter into a contract with the nominated sub-Contractor(s) in accordance with the requirements of Clause 4.4 of the General Conditions of Contract 2015 (3rd Edition).

The Contractor shall provide the following general attendance on nominated and selected sub-Contractors executing the works:

- a) access to the site and places where the subcontracted work shall be carried out, including the reasonable use of any temporary personnel, hoists erected by the Contractor;
- b) the provision of water and lighting and of single phase electric power to a position within 50 m of the place where the subcontracted work shall take place;
- c) the provision of an area for the sub-Contractor to establish temporary facilities;
- d) the use of erected scaffolding that belongs to the Contractor, in common use with others, while it remains erected;
- e) the use of ablution facilities and the like; and
- f) access to telecommunication facilities.

PS 5.8 TESTING, COMPLETION, COMMISSIONING AND CORRECTION OF DEFECTS

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.

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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 Contractor shall allow in his general inspections and tests and for the supply of all necessary equipment that may be required for these tests and/or inspections by the Employer's Agent. The Contractor shall make good any defects prior to commissioning of the works.

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.

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.

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Witness:		Witness:	



In such a case, the Employer's Agent shall be given at least 72 hours' notice when testing is required. No claims, however, shall be considered in respect of delays resulting from such testing.

Whenever the Employer's Agent conducts control testing on behalf of the Contractor, charges shall be levied. The Employer's Agent may, from time to time, carry out his own check tests on the work performed by the Contractor. Should such check tests show the Contractor's control testing to be such that the quality of the Contractor's work can be called into question, then the Employer's Agent may order further check tests to be carried out on work already completed by the Contractor.

All costs associated with such check tests shall be for the Contractor's account as shall the costs of any other check test whose results do not comply with the specification.

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.

The Contractor shall carry out sufficient tests to ensure that the contract requirements for all materials incorporated in the works are complied with. The Employer is at liberty to carry out such tests as he deems necessary to determine compliance with the contract requirements and will make available the results of all tests to the Contractor. The Contractor shall keep systematic records of the test results and all worksheets relating thereto.

PS 5.8.1 Inspection of Works by Local Authority

The Contractor shall afford inspectors from the Local Authority reasonable access to all parts of the site. The Employer's Agent in the presence of representatives of the Local Authority will generally undertake testing of the works. Accordingly the Contractor shall notify the Employer's Agent at least 24 hours in advance as to when the various sections of work will be available for testing. The Employer's Agent may require the Contractor to submit a weekly schedule of times, based on his programme, that he envisages work to be available for testing.

PS 5.8.2 Completion, Commissioning and Correction of Defects

The tendered rates shall include the cost of all activities and tests that may be required in ensuring proper completion and commissioning of the Works, and no additional claims shall be entertained in this respect. This includes the supply of all necessary equipment required for such and / or for inspections by the Employer's Agent and any other relevant authority.

Any defect in the Works shall be corrected to the satisfaction of the Employer's Agent.

PS 5.9 RECORDING OF WEATHER AND ABNORMAL RAINFALL

If during the time for completion of the Works or any extension thereof should abnormal rainfall or wet conditions occur, then an extension of time in accordance with Clause

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5.12 of The General Conditions of Contract 2015 (3rd Edition) hereof shall be granted by the Employer, calculated on the critical path method. It shall be applied as follows:

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

V	Extension of time in calendar days in respect of the calendar month under consideration.
Nw	Actual number of days during the calendar month on which a rainfall of Y mm or more has been recorded.
Nn	Average number of days, as derived from existing rainfall records, on which a rainfall of Y mm or more has been recorded for the calendar month.
Rw	Actual rainfall in mm recorded for the calendar month under consideration.
Rn	Average rainfall in mm for the calendar month as derived from existing rainfall records.

For purposes of the contract Nn, Rn, X and Y shall have those values assigned to them in the Contract Data and/or the Specification.

The total extension of time shall be the algebraic sum of all monthly totals for the period under consideration, but if the total is negative the time for completion shall not be reduced due to subnormal rainfall. Extensions of time for part of a month to be calculated using pro rata values of Nn and Rn.

This formula does not take account of flood damage that could cause further or concurrent delays and will be treated separately as far as extension of time is concerned.

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

The following average rainfall figures are applicable:

INFORMATION SOURCE: South African Weather Service, Midrand, Tel.: 012 367 6014

Y = 10 mm/24-hour day

X = 20 mm

A delay caused by inclement weather conditions will be regarded as a delay if, in the opinion of the Employer's Agent, all progress on an item or items of work on the critical part of the working programme of the Contractor has been brought to halt. Delays on working days only (based on a five day working week) will be taken into account for the extension of time, but the Contractor shall make provision in his programme of work for

Employer:		Contractor:	
Witness:		Witness:	



an expected delay of 15 (fifteen) working days caused by normal rainy weather, for which he will not receive any extension of time.

Daily records of rainfall and activities within the critical parts affected shall be kept by the Contractor and signed by the Employer's Agent's representative on the site. For this, accurate rain gauging shall be taken at a suitable point on the site, and the Contractor shall, at his own expense, take all necessary precautions to ensure that unauthorised persons do not interfere with the rain gauges. Failure to produce signed copies of the above records on a daily basis to the Employer's Agent's representative on the site after the event having occurred will be deemed to be in breach of this Clause and will not be admissible for purposes of seeking an extension of time.

The Contractor shall be permitted to take his own rainfall measurements on site subject to the Employer's Agent's approval, but access to the measuring gauge(s) shall be under the Employer's Agent's control. The Contractor is to provide and install all the necessary equipment for accurately measuring the rainfall as well as to provide, erect and maintain a security fence plus gate, padlock and keys at each measuring station, all at his own cost.

PS 5.10 FORMAT OF COMMUNICATIONS

The Contractor and Employer shall follow the communication protocol through the Employer's Agent and Contractor representatives. Communication media applicable shall be site meetings, telephone, fax, letter and email.

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))

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- Time or task rate
- Allocated Supervisor/foreman
- Health and Safety induction undergone
- Training provided
 - i. Trainer details
 - ii. Type of training
 - iii. Duration of training
 - iv. Cost of training
 - v. Attendance register
- Performance rating (good, fair, poor)
 - i. For training
 - ii. Work execution
 - iii. Health and safety awareness
- Additional training or supervision to be provided
- Proof of Monthly and cumulative payments, including salaries or wages
- UIF Returns
- Certified copy of the contractual agreement not validated older than three months.

c) SMMEs

- Process of recruitment, selection and appointment
- Company name
- Company contact details (address, telephone numbers and ward number)
- Company registration (also VAT and TAX)
- Company age (months or years)
- Type of company
- Company size (number of permanent employees)
- Name and surname of owner
- Owner contact details (address and telephone numbers and ward number)
- Gender, age and PDI status
- Contract signed
- Certified copies of ID
- Proof of Compliance with COID Act, which will be valid for the duration of the

Construction period.

- 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

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- 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.

PS 5.11 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

The key role players involved or associated with the contract are listed below with references made to the General Conditions of Contract.

- The Employer (GCC, Clause 1.1.1.15)
- The Employer's Agent (GCC, Clause 1.1.1.16)
- The Employer's Agent 's Representative (GCC, Clause 1.1.1.17)
- The Contractor (GCC, Clause 1.1.1.9)
- The Contractor's Site Agent (GCC, Clause 4.12.2)
- Responsible person in terms of the OHAS Act

PS 5.12 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 project progress, resources (human, plant and equipment), community issues, environmental and health and safety aspects.

PS 5.13 FORMS FOR CONTRACT ADMINISTRATION

The Contractor shall maintain a file which shall contain project information related to project progress, resources (human, plant and equipment), community issues, environmental, health and safety aspects, penalties imposed, claims lodged and outcomes, disputes and resolutions, payment and variations.

PS 5.14 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.

Employer:		Contractor:	
Witness:		Witness:	



Such records shall be the property of the Employer and shall be made available to the Employer or his representative within 24 hours from being requested to do so.

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

PS 5.15 BONDS AND GUARANTEES

The Contractor shall within the period stated in the Contract Specific Data, of this document, provide the Employer with a Surety Bond in the form of a Bank Guarantee, Bank Transfer or a Guarantee from an approved Insurance Company to the satisfaction of the Employer in the form included in the Tender Documents. The Bank Guarantee shall be for an amount equal to ten per cent (10%) of the Tender Sum, for the due and punctual fulfilment and completion of all the Contractor's obligations under the Contract. No Extension of Time or any variation of the Contract nor the termination of the Contract by the Employer in terms of GCC 2015 hereof shall in any way impair or diminish or terminate any liability to the Employer under and by virtue of such Surety Bond. The cost of the Surety Bond to be so entered into, shall be at the expense in all respects of the Contractor; the Surety Bond to be released upon issue of the Employer's Agent's Certificate of Completion of the Works, unless otherwise stated in the Contract Data

Should the Contractor, when notified of the acceptance of his offer, fail to provide an approved Surety Bond within the stated period, then the Employer may, at his sole discretion:

- (a) Grant the Contractor a further reasonable period in which to provide the bond; or
- (b) Withdraw his acceptance of the tender, in which case the Contract shall be deemed to be void, but without prejudice to the Employer's rights to recover whatever damages he may have suffered by virtue of the Contractor's failure to fulfil his obligations.

PS 5.16 PAYMENT CERTIFICATES

Measurements will be done continuously between the Employer's Agent's Representatives and the Contractor on dates and times agreed on. Dates must be arranged by these parties. The progress of the following items will be recorded hereunder:

- The Contractor will provide a certificate with quantities to the Employer's Agent before or on the 21st of every month.
- If any material on site is claimed, proof of ownership must be provided either by means of the necessary receipts or a letter from the supplier stating that ownership has been transferred to the Contractor upon delivery.
- After the payment certificate has been approved by Employer's Agent, the Contractor must issue a VAT invoice. The certificate will then be ready for handing in.
- Payment certificates must be completed monthly and submitted before or on the 21st of each month. The Contractor must familiarize themselves with the payment circle under Clause 6.10.4 of the General Conditions of Contract for Construction Works 2015.

Employer:		Contractor:	
Witness:		Witness:	



PS 6 FEATURES REQUIRING SPECIAL ATTENTION

PS 6.1 SECURITY

The Contractor shall be responsible for the security of his personnel; materials and construction plant on and around the site of the Works and for the security of his camp, and the Employer in this regard will consider no claims. An item has been included in the Bill of Quantities to cover additional security needs should the Employer's Agent deem this necessary. The Contractor shall also ensure that none of his activities on site compromise the safety and security of the UTi premises, or adjacent properties. The Contractor shall liaise with the relevant authorities of these properties and provide security to their satisfaction. The Contractor shall also liaise with them for access to respective properties and for permission to set up the Contractor's camp. The daily access to arrangements to site shall be to the satisfaction of the relevant governing bodies of the properties concerned.

PS 6.2 OPERATION OF VALVES

It shall be necessary to isolate a portion of the reticulation to execute the Works. The Contractor shall not operate any valves. Requests for isolation of the pipe section shall be made to the Zandfontein Depot, on (011) 531 9550 at least 4 working days in advance. The Employer's Agent shall arrange for valve closure by The Employer's personnel.

PS 6.3 COMMUNITY LIAISON AND COMMUNITY RELATIONS

In all dealings with the community and workers employed from within the community, the Contractor shall take due cognizance of the character, culture and circumstances of the community involved and shall at all times use his/her best endeavours to avoid the development of disputes and to foster a spirit of co-operation and harmony towards the project.

The Contractor shall at all times, keep the Employer's Agent fully informed on all matters affecting the community and shall at all times maintain good public relations with The Employer's customers and the public. The Contractor shall at all times, keep the Employer's Agent fully informed of progress and planned interruption on all matters affecting the community.

PS 6.4 NOTICE AND WARNING TO CONSUMERS

The Contractor will arrange for the warning of the public of any shutdown of supply necessary in his opinion for the proper execution of the Works. The Contractor must, however, give at least 10 (ten) days' notice to the Employer's Agent of his requirements in this respect. Notice costs to be provided for in the tender price. Assistance in connection to Notices and Warning to Customers can be obtained from The Employer's Customer Service at this Number (011) 688-1500.

PS 6.5 CONTINUITY OF WATER SUPPLY TO CONSUMERS

Every effort must be made to ensure continuity of water supply to the consumers. No consumer may be left without water overnight. In cases where a consumer has to be given water after the Contractor has left the site for the night, a penalty of R 1,000-00 will be deducted from the payment certificate.

Employer:		Contractor:	
Witness:		Witness:	



PS 6.6 CONDITIONS AND PROCEDURES FOR SERVICE AGENCIES

The Contractor shall throughout the Contract take adequate precautions to protect all existing services from damage whether or not they have been pointed out to him. The Contractor shall as soon as practically possible inform the Employer's Agent of any damages to services and shall not repair any such damage unless instructed to do so.

All cables and pipes shall be considered "live" unless confirmed otherwise by the relevant service authority.

PS 6.7 REINSTATEMENT OF ASPHALT BY JOHANNESBURG ROADS AGENCY

Johannesburg Roads Agency (JRA) will reinstate all asphalt surfaces, upon satisfactory completion and compaction of the preceding layers by the Contractor. The Contractor must temporarily reinstate (using suitable gravel material from the trench excavation) up to the existing asphalt to keep good riding conditions and safe traffic. The Contractor will be responsible for the temporary reinstatement for a period of 2 weeks from the acceptance of the layer works by JRA.

The minimum requirements of the road authority are that the structural layers of the backfilled trench, i.e. the base, subbase, selected subgrade and subgrade down to a depth of 800 mm below the level of the surfacing of the road, must have at least the same shear strengths as those of the adjacent undisturbed structural layers.

It should be noted that it is generally very difficult to obtain the same quality structural layers in the confinement of a narrow trench as that of the undisturbed adjacent structural layers when the same materials are re-used.

The following method must therefore be used to ensure adequate shear strengths in trench backfill.

- Use of a special "3MPa Hydrofill Rapid" concrete mix must be made for the final backfilling layer of 300mm.
- All Road Trenches/Openings: Place 300 mm "3MPa Hydrofill Rapid" concrete manufactured according to the required specification. The mix is to be placed 100 mm below the level of the surrounding sound surface of the road. The remainder of the trench, above the bedding, shall be backfilled with selected approved material compacted to 90% of MOD AASHTO density.
- All Footway Trenches / Openings: Place 150 mm "3MPa Hydrofill Rapid" concrete manufactured according to the required specification. The mix is to be placed 110 mm below the level of the surrounding sound surface. The remainder of the trench, above the bedding, shall be backfilled with selected approved material compacted to 90% of MOD AASHTO density.

The following properties are achieved with "3MPa Hydrofill Rapid" concrete:

- Excellent drainage.
- Non-shrink properties.
- High compressive strength due to point-to-point contact of coarse aggregate.

Employer:		Contractor:	
Witness:		Witness:	



- Very low tensile strength due to the limited amount of cement, i.e., less than 0.5 MPa.
- Economical and easy to mix and place with wheelbarrows.

It is recommended that the coarse aggregate that is used for no-fines concrete be single-sized.

The following table provides no-fines concrete for areas around Johannesburg.

Proportions by Dry Mass (kg/m³) – “3MPa Hydrofill Rapid” mix may be obtained from Holcim or other supplier.

PS 6.8 COMPENSATION

Any claims from the property owners and / or the community will be considered and evaluated by the Employer's Agent. Should the Employer's Agent find a valid claim but found that the Contractor has neglected his responsibilities and / or duties, which lead to the claim, the Contractor will be responsible for settling the claim, and all costs involved.

PS 7 HEALTH AND SAFETY SPECIFICATION FOR CONSTRUCTION WORK

The Occupational Health and Safety Specification of the Employer's is bound in Volume 2 of these contract documents. Volume 2 forms an integral part of the Contract Specification and, in particular, shall be a part of the HEALTH AND SAFETY SPECIFICATION FOR CONSTRUCTION WORK.

In terms of Construction Regulations 4 (1) (a) of the Occupational Health and Safety Act, Act No 85 of 1993, the Employer is required to compile an occupational health and safety specification for any intended project and to provide the specification to prospective tenderers.

The objective of this specification is to ensure that the principal Contractor entering into a contract with the Employer achieves and maintains an acceptable level of occupational health and safety performance.

The specification provides the requirements that the principal Contractor and other Contractors shall comply with in order to reduce the risks associated with the contract work, and that may lead to incidents causing injury and/or ill health, to a level as low as reasonably practicable and possible.

The Contractor, appointed by the Employer in terms of Regulation 4 (1) (c), is required to prepare an occupational health and safety plan.

This plan has to be prepared in terms of Regulation 5 (1) as well as the Employer's occupational health and safety specification. In terms of Regulation 4 (2), the Employer and the principle Contractor are required to agree on the occupational health and safety plan before any work may commence.

The principal Contractor's health and safety plan has to follow the framework in Volume 2, as a minimum.

PS 7.1 Site Specific Health and Safety Issues

Employer:		Contractor:	
Witness:		Witness:	



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The following site specific assessment of health and safety issues includes a list of risk assessment headings that have been identified by the Employer as possibly applicable to the contract work for this project.

- Aggregate/Sand Delivery
- Arc welding
- Bench grinder
- Construction of manholes
- Compressed gas cylinders-handling
- Compressors – Air
- Cutting of pipes
- Distribution boards – Electrical
- Drivers – of vehicles
- Electrical installation – Maintenance of
- Excavator
- Gas explosions
- Fire prevention and protection
- Form and support work
- Front end loader
- Fuel supply
- Gas welding-cutting operations
- Hand and spray painting
- Hand tools
- Landscaping
- Laying of pipes
- Levelling – of materials
- Loading supervisor
- Loading/unloading - of trucks
- Machine operator
- Making of steel items
- Material delivery
- Material handling
- Mixer operator
- Pedestal drill
- Pedestal grinder
- Placing concrete
- Portable ladders
- Refuelling vehicles/plant
- Scaffolding
- Site establishment
- Trenches – Digging of
- Trees – Bracing/removing if roots are
- Damaged during excavations

Employer:		Contractor:	
Witness:		Witness:	



- Use of angle grinder
- Use of portable electrical tools
- Work in confined spaces
- Work in elevated positions
- Working close to existing services i.e. electrical, waste water etc
- Working close to water
- Workshops

PS 7.2 Barricading of Trenches

The Contractor shall ascertain himself of the nature, volume, stability, depth and possible safety risks of the excavations, before any decision with regards to the method of excavation is made.

Allowance for hand excavation has been made for the location of services. Extreme caution shall be taken when excavating along the route of the new pipe for existing services. Any damages and or repairs to the existing services will be for the Contractor's account.

The length of open excavation must at all times not exceed 100m

Adequately protected by a barrier or fence comprising fluorescent orange plastic netting of height at least 1 000mm and as close to the excavation as practicable; and

- Provided with notice boards marked "CLOSED " at each end of closed or partially closed roads,
- The barrier or fence (at least 1m high) shall be suitably wrapped with reflective red and white danger tape or provided with flashing orange lights, placed at 15m intervals along the barricading at night.
- Where the depth of an excavation or the nature of the material excavated renders the sides of the excavation liable to movement that might endanger the works or the workers engaged on the excavation,
- the sides of the excavation shall be supported by suitable timber or other sheeting adequately strutted and braced, all properly assembled and of sufficient strength and stiffness to prevent movement in the materials supported, or, alternatively,
- the slope of the excavated face or faces shall be reduced so that any danger to the works or workers is removed.

Any cavities formed by the fall of rock or earth due to rain, flooding, insufficient timbering or other causes, shall be adequately filled.

The Contractor shall so maintain borrow pits that they do not become a danger to persons or livestock.

Trenches may not be left open during the builder's holidays or for any shutdown period exceeding 5 calendar days. Should the Contractor not comply with this requirement without the written approval of the Employer's Agent ; the Employer's Agent shall have the open trenches closed by others at the expense of the Contractor. Furthermore, all further opening-up of the backfilled excavation and dealing with the excavated material and subsequent making good will all be to the Contractor's cost.

Employer:		Contractor:	
Witness:		Witness:	



PS 7.3 Precaution against Pollution and Contamination

The Contractor shall take all necessary steps and precautions to prevent pollution of the surrounding area by his employees in any way. Any debris falling from construction vehicles and plant shall be removed immediately.

Every care is to be taken to avoid possible contamination of the mains during construction. Pipes are not to be stacked in the streets or gutters. On completion of a section, all loose material and foreign bodies are to be removed. The open ends of the new pipeline are to be protected by watertight caps, to the satisfaction of the Employer's Agent, to prevent the entrance of groundwater and foreign bodies until such time as these sections are connected to the live mains.

Sterilising chemicals shall be supplied by the Contractor for sterilizing all new water mains. All new lines are to be thoroughly flushed. All sterilisation shall be done at 10mg/ℓ free chlorine for 12 hours. The Contractor shall give due notice to The Employer of his intention.

PS 7.4 Operations under Live Conditions

Prior to the execution of any operation under live conditions, the Contractor shall liaise with the Johannesburg Water Zandfontein Depot Manager, at least 4 working days in advance, in this regard. At least one representative of the Works shall be present during the execution of such operation. These operations will include disconnection and reconnection to the existing Sewer/ Storm water main and Water storage tank at the works.

PS 8 ENVIRONMENTAL MANAGEMENT

The Contractor shall acquaint himself and his staff with the provisions of any potential EMP and applicable regulations, duties, obligations and prohibitions and shall accept responsibility for due compliance with the aforementioned. In the case of failure to comply with any requirements of any potential EMP, the Employer shall be entitled to employ and pay other persons to undertake any remedial work or measures to rectify any consequences or prevent possible consequences resulting from the non-compliance by the Contractor and all costs consequent thereto shall be borne by the Contractor and shall be recovered from him by the Employer. If it is not practical to rectify any consequence resulting from the non-compliance of the Contractor with the requirements of the EMP, the Employer will be entitled to impose a penalty on the Contractor which penalty shall be in relation to the expense which the Contractor would have incurred to comply. A generic EMP is attached in Volume 2.

Employer:		Contractor:	
Witness:		Witness:	



PORTION B: VARIATIONS AND ADDITIONS TO THE STANDARDISED SPECIFICATIONS

The following variations and additions to the SANS 1200 Standardized Specifications referred to in the last clause of Portion A apply to this Contract. The prefix PS indicates an amendment to SANS 1200. The letters and numbers following these prefixes respectively indicate the relevant Standardized Specification and clause numbers in SANS 1200.

PSA GENERAL

PSA 2 INTERPRETATIONS

PSA 2.3 DEFINITIONS

a) General

ADD THE FOLLOWING DEFINITIONS:

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

Specified: As specified in the standardized specifications, the Drawings, the Project Specifications or Particular Specifications. Specifications shall have the corresponding meaning.”

c) Measurement and payment

REPLACE THE DEFINITIONS FOR “fixed charge”, “time-related charge” AND “value-related charge” WITH THE FOLLOWING:

“Fixed charge: A charge that is not subject to adjustment on account of variation in the value of the Contract amount or the Contract Time of Completion.

Time-related charge: A charge, the amount of which varies in accordance with the Time for Completion of the work, adjusted in accordance with the provisions of the Contract.

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

PSA 3 MATERIALS

PSA 3.1 QUALITY

ADD THE FOLLOWING:

“All manufactured materials supplied shall be new materials unless the contrary is specified. All materials specified in accordance with SANS Specifications shall bear the SANS mark, whether so specified or not.”

ADD THE FOLLOWING SUB-CLAUSE:

PSA 3.3 ORDERING OF MATERIALS

Employer:		Contractor:	
Witness:		Witness:	



The quantities set out in the Schedule of Quantities have been carefully determined from calculations based on data available at the time and should therefore be considered to be approximate quantities only. Before ordering materials of any kind the Contractor shall check with the Employer's Agent whether or not the scope of the work for which the materials are required is likely to change substantially. No liability or responsibility whatsoever shall be attached to the Employer for materials ordered by the Contractor except when ordered in accordance with written confirmation issued by the Employer's Agent."

PSA 4 PLANT

PSA 4.1 SILENCING OF PLANT

REPLACE THE CONTENTS OF SUBCLAUSE 4.1 WITH THE FOLLOWING:

"The Contractor's attention is drawn to the applicable regulations pertaining to noise and hearing conservation, framed under the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) as amended.

The Contractor shall at all times and at his own cost, be responsible for implementing all necessary steps to ensure full compliance with such regulations, including but not restricted to the provision and use of suitable and effective silencing devices for pneumatic tools and other plant which would otherwise cause a noise level in excess of that specified in the said regulations.

Where appropriate, the Contractor shall further, by means of temporary barriers, effectively isolate the source of such noise in order to comply with the said regulations."

PSA 5 CONSTRUCTION

PSA 5.1 SURVEY

PSA 5.1.2 Preservation and replacement of survey beacons and pegs subject to the Land Survey Act

DELETE THE WORDS "in the vicinity of boundaries" IN THE SECOND SENTENCE OF SUBCLAUSE 5.1.2 AND REPLACE THE WORDS "under the direction of" IN THE SAME SENTENCE WITH "in consultation and liaison with."

ADD THE FOLLOWING AFTER THE SECOND SENTENCE OF SUBCLAUSE 5.1.2:

"The Contractor and the Employer's Agent shall record on the said list, their concurrence or disagreement (as the case may be) regarding the completeness and accuracy of the details recorded therein."

REPLACE THE THIRD SENTENCE OF SUBCLAUSE 5.1.2 WITH THE FOLLOWING:

"At the completion of the Contract, the Contractor shall expose all pegs that were listed at the commencement of the construction as being in order and the Contractor shall arrange with a registered Land Surveyor for the checking of the positions of all such pegs and the replacement of those that the Land Surveyor's check reveals have become disturbed or damaged. The Contractor shall, as a precedent to the issue of the Certificate of Completion, provide to the Employer's Agent, a certificate from the registered Land Surveyor, certifying that all the pegs listed at the commencement of

Employer:		Contractor:	
Witness:		Witness:	



construction in accordance with the provisions of this clause, have been checked and that those found to have been disturbed, damaged or destroyed have been replaced in their correct positions, all in accordance with the provisions of the said Act.

The costs of all checking, replacement and certification as aforesaid shall be entirely for the Contractor's account. This, with the provisions always that the Contractor shall not be held liable for the cost of replacement of pegs which:

- (a) cannot reasonably be re-established in their original positions by reason of the finished dimensions of the permanent works, and
- (b) the contractor can prove beyond reasonable doubt to the satisfaction of the Employer's Agent, were disturbed, damaged or destroyed by others beyond his control."

PSA 5.3 PROTECTION OF EXISTING STRUCTURES

REPLACE "Machinery and Occupational Safety Act, 1983 (Act No 6 of 1983)" WITH "Occupational Health and Safety Act, 1993 (Act No 85 of 1993), as amended," AND INSERT THE FOLLOWING AFTER "(Act No. 27 of 1956)": "as amended."

PSA 5.4 PROTECTION OF OVERHEAD AND UNDERGROUND SERVICES

REPLACE THE HEADING AND THE CONTENTS OF SUBCLAUSE 5.4 WITH THE FOLLOWING:

PSA 5.4 LOCATION AND PROTECTION OF EXISTING SERVICES

PSA 5.4.1 Location of existing services

Before commencing with any work in an area, the Contractor shall ascertain the presence and actual position of all services which can reasonably be expected by an experienced and competent Contractor to be present on, under, over or within the Site.

Without in any way limiting his liability in terms of the Conditions of Contract in relation to damage to property and interference with services, the Contractor shall, in collaboration with the Employer's Agent, obtain the most up-to-date plans as are available, showing the positions of services existing in the area where he intends to work. Neither the Employer nor the Employer's Agent offers any warranty as to the accuracy or completeness of such plans and because services can often not be reliably located from plans, the Contractor shall ascertain the actual location of services depicted on such plans by means of careful inspection of the Site.

Thereafter, the Contractor shall, by the use of appropriate methodologies, carefully expose the services at such positions as are agreed to by the Employer's Agent, for the purposes of verifying the exact location and position of the services. Where the exposure of existing services involves excavation to expose underground services, the further requirements of sub clauses 4.4 and 5.1.2.2 of SANS 1200 D (as amended) shall apply.

The aforesaid procedure shall also be followed in respect of services not shown on the plans but which may reasonably be anticipated by an experienced Contractor to be present or potentially present on the site.

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Witness:		Witness:	



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All services, the positions of which have been determined as aforesaid at the critical points, shall henceforth be designated as 'known services' and their positions shall be indicated by the Contractor on a separate set of drawings, a copy of which shall be furnished to the Employer's Agent without delay.

As soon as any service which has not been identified and located as described above is encountered on, under, over or within the site, it shall henceforth be deemed to be a known service and the aforesaid provisions pertaining to locating, verifying and recording its position on the balance of the site shall apply. The Contractor shall notify the Employer's Agent immediately when any such service is encountered or discovered on the Site.

Whilst he is in possession of the Site, the Contractor shall be liable for all loss of or damage as may occur to

- (a) known services, anywhere along the entire lengths of their routes, as may reasonably be deduced from the actual locations at which their positions were verified as aforesaid, due cognizance being taken of such deviations in line and level which may reasonably be anticipated, and
- (b) any other service which ought reasonably to have been a known service in accordance with the provisions of this clause.

The Contractor shall also be liable for consequential damage in regard to (a) and (b), whether caused directly by the Contractor's operations or by the lack of proper protection.

No separate payment will be made to the Contractor in respect of any costs incurred in preparing and submitting to the Employer's Agent the Drawings as aforesaid. These costs shall be deemed included in the Contractor's other tendered rates and prices included in the Contract.

Payment to the Contractor in respect of exposing services at the positions agreed by the Employer's Agent and as described above will be made under the payment items (if any) as may be provided for in the respective sections of the specifications pertaining to the type of work involved.

PSA 5.4.2 Protection during construction

The Contractor shall take all reasonable precautions and arrange its operations in such a manner as to prevent damage occurring to all known services during the period which the Contractor has occupation and/or possession of the Site.

Services left exposed shall be suitably protected from damage and in such a manner as will eliminate any danger arising there from to the public and/or workmen, all in accordance with the requirements of the prevailing legislation and related regulations.

Unless otherwise instructed by the Employer's Agent, no services shall be left exposed after its exact position has been determined and all excavations carried out for the purpose of exposing underground services shall be promptly backfilled and compacted. In roadways, the requirements of Subclause 5.9 of SANS 1200 DB should be observed. In other areas compaction is to be to 90% modified AASHTO density.

PSA 5.4.3 Alterations and repairs to existing services

Employer:		Contractor:	
Witness:		Witness:	



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Unless the contrary is clearly specified in the Contract or ordered by the Employer's Agent, the Contractor shall not carry out alterations to existing services. When any such alterations become necessary, the Contractor shall promptly inform the Employer's Agent, who will either make arrangements for such work to be executed by the owner of the service, or instruct the Contractor to make such arrangements himself.

Should damage occur to any existing services, the Contractor shall immediately inform the Employer's Agent, or when this is not possible, the relevant authority, and obtain instructions as to who should carry out repairs. In urgent cases, the Contractor shall take appropriate steps to minimize damage to and interruption of the service. No repairs of telecommunication cables or electric power lines and cables shall be attempted by the Contractor.

The following list of contact telephone numbers is provided for:

Service	Authority	Contact Details	Contact Number
Communication	Telkom	J Tshabalala	(011) 301-9052
Electricity	Eskom	K Bedessie	(011) 711-2290
Municipal Electricity	City Power	D Oliver	(011) 490-7195
Gas	Sasol	B van der Heuvel	(011) 617-8261
Bulk Water	Rand Water	I Davids	(011) 682-0911
Provincial Road	Gautrans	J Olivier	(012) 310-2200
Municipal Road	Johannesburg Roads Agency	J Montero	(011) 298-5000

Wayleaves should also be consulted regarding contact numbers for relevant service authorities.

PSA 5.5 DEALING WITH WATER

In addition to the items as set out in Subclause 5.5, the contractor shall also provide pumping equipment, pipes and other equipment as may be necessary.

PSA 5.9 SANITARY FACILITIES

Add the following new subclause:

The Contractor shall provide, maintain and finally remove from site adequate sanitary facilities. The sanitary facility shall be properly ventilated and clean at all times. The use of the sanitary facilities shall be strictly enforced.

PSA 6 TOLERANCES

ADD THE FOLLOWING SUBCLAUSE TO CLAUSE 6:

PSA 6.4 USE OF TOLERANCES

No guarantee is given that the full specified tolerances will be available independently of each other, and the Contractor is cautioned that the liberal or full use of any one or more of the tolerances may deprive him of the full or any use of tolerances relating to other aspects of the work.

Employer:		Contractor:	
Witness:		Witness:	



Except where the contrary is specified, or when clearly not applicable, all quantities for measurement and payment shall be determined from the 'authorised' dimensions. These are specified dimensions or those shown on the drawings or, if changed, as finally prescribed by the Employer's Agent, without any allowance for the specified tolerances. Except if otherwise specified all measurements for determining quantities for payment will be based on the 'authorised' dimensions.

If work is constructed in accordance with the 'authorised' dimensions plus or minus the tolerances allowed, the calculation of quantities will be based on the 'authorised' dimensions, regardless of the actual dimensions to which the work has been constructed.

When the work is not constructed in accordance with the 'authorised' dimensions plus or minus the tolerances allowed, the Employer's Agent may nevertheless, at his sole discretion, accept the work for payment. In such cases no payment shall be made for quantities of work or material in excess of those calculated for the 'authorised' dimensions, and where the actual dimensions are less than the 'authorised' dimensions minus the tolerance allowed, quantities for payment shall be calculated based on the actual dimensions as constructed."

PSA 7 TESTING

PSA 7.1 PRINCIPLES

Add the following new subclause:

PSA 7.1.3 Cost of Testing

The cost of all testing to be carried out by the Contractor in terms of the requirements of the relevant SABS 1200 standards shall be included in the rates for the various work items listed in the Schedule of Quantities. No separate payments shall be made in this regard.

The Employer's Agent may order the Contractor to arrange special check tests to be carried out by an approved independent laboratory. The cost of special check tests ordered by the Employer's Agent shall be borne by the Employer if the test results indicate compliance with the specification and by the Contractor if the results indicate non-compliance with the specification.

PSA 7.2 APPROVED LABORATORIES

REPLACE THE CONTENTS OF SUBCLAUSE 7.2 WITH THE FOLLOWING:

"Unless otherwise specified in the relevant specification or elsewhere in the Project Specification, the following shall be deemed to be approved laboratories in which design work, or testing required in terms of a specification for the purposes of acceptance by the Employer's Agent of the quality of materials used and/or workmanship achieved, may be carried out:

- (a) Any testing laboratory certified by the South African National Accreditation Systems (SANAS) in respect of the nature and type of testing to be undertaken for the purposes of the Contract;
- (b) Any testing laboratory owned, managed or operated by the Employer or the Employer's Agent ;

Employer:		Contractor:	
Witness:		Witness:	



- (c) Any testing laboratory established and operated on the Site by or on behalf of the Employer or the Employer's Agent ;
- (d) Any other laboratory that the Employer's Agent approves in his absolute discretion."

PSA 8 MEASUREMENT AND PAYMENT

PSA 8.1 MEASUREMENT

PSA 8.1.2 Preliminary and General Item or Section

PSA 8.1.2.1 Contents

REPLACE THE LAST SENTENCE OF SUBCLAUSE 8.1.2.1(b) WITH THE FOLLOWING:

"Separate items will be scheduled to cover the fixed, value-related and time-related components of the Contractor's preliminary and general costs."

PSA 8.2 PAYMENT

PSA 8.2.1 Fixed-charge and Value-related Items

REPLACE THE CONTENTS OF SUBCLAUSE 8.2.1 WITH THE FOLLOWING:

PSA 8.2.1.1 Fixed-charge Items

Payment of fixed charges in respect of item 8.3.1 will be made as follows:

- (a) EIGHTY PER CENT (80%) of the sum tendered will be paid when the facilities have been provided and approved;
- (b) The remaining TWENTY PER CENT (20%) will be paid when the works have been completed, the facilities have been removed and the site of the Contractor's establishment has been cleared and cleaned to the satisfaction of the Employer's Agent .

No adjustment will be made to the sum tendered in respect of item 8.3.1 should the value of the works finally executed or the time for completion vary in any way from that specified in the tender."

PSA 8.2.1.2 Value-related Items

Payment for the sum tendered under item 8.3.2 will be made in three separate instalments as follows:

- (a) The first instalment, which is 40% of the sum, will be paid when the Contractor has fulfilled all his obligations to date under this specification, the General Conditions of Contract and the Special Conditions of Contract, and when the value of work certified for payment, excluding materials on site and payments

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for preliminary and general items, is equal to not less than 5% of the total value of the work listed in the Schedule of Quantities.

- (b) The second instalment, which is 40% of the sum, will be made when the amount certified for payment, including retention moneys but excluding this second instalment, exceeds 50% of the tender sum.
- (c) The final payment, which is 20% of the sum, will be made when the works have been certified as completed and the Contractor has fulfilled all his obligations to date under this Specification, the General Conditions of Contract and the Special Conditions of Contract.

Should the value of the measured work finally completed be more or less than the tender sum, the sum tendered under item 8.3.2 will be adjusted up or down in accordance with the provisions of clause 6.11 of the Conditions of Contract 2015, and this adjustment will be applied to the third instalment."

PSA 8.2.2 Time-related Items

REPLACE THE CONTENTS OF SUBCLAUSE 8.2.2 WITH THE FOLLOWING:

"Subject to the provisions of sub clauses 8.2.3 and 8.2.4, payment under item 8.4.1 (time-related item) will be made monthly in equal amounts, calculated by dividing the sum tendered for the item by the tendered contract period in months, provided always that the total of the monthly amounts so paid for the item is not out of proportion to the value of the progress of the Works as a whole."

PSA 8.3 SCHEDULED FIXED-CHARGE AND VALUE-RELATED CHARGE

ADD THE FOLLOWING NEW SUBCLAUSES TO CLAUSE 8.3

PSA 8.3.5 Additional Contractual Obligations

PSA 8.3.5.1 Notice and warning to consumers Unit
: Sum

The sum shall cover the full compensation and cost of supply and delivery of the notices and warnings to customers at least 3 days before a shutdown is to take place in each section of work.

PSA 8.3.5.2 OHS Act Obligations Unit:
Sum

The sum shall cover the full compensation and fixed costs for the compliance with the Occupational Health and Safety Act, Construction Regulations 2003 and all the requirements stipulated in the Employer's Health and Safety Specifications."

PSA 8.3.5.3 EMP Obligations Unit:
Sum

The sum shall cover the full compensation and all fixed costs for compliance with the requirements of The Employer's Environmental Management Plan or applicable regulations.

Employer:		Contractor:	
Witness:		Witness:	



PSA 8.4 SCHEDULED TIME-RELATED ITEMS

ADD THE FOLLOWING NEW SUBCLAUSES TO CLAUSE 8.4.

PSA 8.4.6 Additional Obligations

PSA 8.4.6.1 OHS Act
 Obligation..... Unit: Sum

The sum shall cover the full compensation and all time related costs for the duration of the contract, for the compliance with the Occupational Health and Safety Act, Construction Regulations 2003 and all the requirements stipulated in the Employer's Health and Safety Specifications.

PSA 8.4.6.2 Security services costs Unit:
 Month

The sum shall cover the full compensation and all costs for a sufficient 24 hour guarded services for the duration of the contract. This sum shall also cover the security requirements of the relevant privately owned properties impacted upon by the construction works, as well as negotiations with the owners of the properties in this regard.

PSA 8.4.6.3 Community Liaison Officer..... Unit:
 Month

The stated sum shall cover full compensation and all costs payable on a monthly basis, to provide a full time qualified and suitable experienced Community Liaison Office for the duration of the contract. The stated sum shall also cover for the CLO cell phone airtime.

PSA 8.5 SUMS STATED PROVISIONALLY BY EMPLOYER'S AGENT

AMEND SUBCLAUSE 8.5.b) 1 AND ADD THE FOLLOWING ITEMS:

- i) Alteration to existing services by authorities Unit: Prov
Sum
- ii) Control tests by independent laboratory Unit: Prov
Sum
- iii) Provision of photographic records Unit: Prov
Sum
- iv) CLO and CSO..... Unit: Prov
Sum
- v) Temporary protection of services..... Unit: Prov
Sum
- vi) Reinstatement of asphalt by JRA..... Unit: Prov
Sum
- vii) Supply or hire of specialist equipment Unit: Prov
Sum
- viii) Training of labour..... Unit: Prov
Sum

Employer:		Contractor:	
Witness:		Witness:	



ix) Cathodic Protection Unit: Prov
 Sum

The Contractor is responsible for both the cost of normal testing as described in the Project Specifications and for the cost of any additional test that indicates that the Specifications have not been complied with.

These Provisional Sums are at the disposal of the Employer's Agent and will be paid if and when the need arises.

PSA 8.7 DAYWORKS

ADD THE FOLLOWING NEW CLAUSES:

PSA 8.7.1 Scope

This section covers the method of measurement and payment for work carried out on a day work basis.

PSA 8.7.1.1 General Requirements

Work will be classified as day work only if the Employer's Agent considers no other rate in the Bill of Quantities appropriate for payment purposes.

An instruction regarding all work to be carried out under day work in terms of Clause 6.5 of the General Conditions of Contract 2015 will be issued at the discretion of the Employer's Agent. Some or all of the items priced under day work in the Bill of Quantities may possibly not be required for this Contract.

Before ordering any material, the Contractor shall submit quotations to the Employer's Agent for his approval, and shall submit such receipts or vouchers to the Employer's Agent as may be necessary for proving the amount claimed.

PSA 8.7.1.2 Measurement and Payment - Day works

The day work rates submitted for vehicles and construction equipment, in the Bill of Quantities shall be a hire charge for the use of the vehicle and driver or constructional plant/equipment and operator (excluding VAT) and shall apply only to vehicles and construction equipment approved in writing by the Employer's Agent. The rate shall include for maintenance, fuels and oils and other operating costs, establishment, insurance and other contingency costs relating to the running of the vehicle, plant or equipment.

Where there is ambiguity between the power developed at the flywheel and mass of a machine, the power shall govern the measurement category.

The Contractor and the Employer's Agent will agree on the method of recording the working hours prior to the commencement of the work. Any long period of idling at any one time which in the opinion of the Employer's Agent or his representative is beyond that required for normal operating conditions will not be paid for as working time. Non-working hours for any reason shall not be measured for payment.

Employer:		Contractor:	
Witness:		Witness:	



The ten percent allowed for overheads etc. as per Clause 6.5.1.2.3 of the General Conditions of Contract 2015 shall include full compensation for all administrative costs, supervision, overheads, liabilities and obligations related to the running of the vehicles, constructional plant and equipment. The tendered percentage shall also include for profit and shall be subject to the Contract Price Adjustment factor laid down in the Contract Data.

PSA 8.8 TEMPORARY WORKS

PSA 8.8.4 Existing Services

AMEND THE SUB CLAUSE AS FOLLOWS:

- PSA8.8.4** a) Supply or hire of specialist equipment Unit:
Prov Sum

The sum shall cover the cost for the supply, operation and/or hire of specialist equipment for detection of underground services as ordered by the Employer's Agent .

- PSA 8.8.4** b) Excavate by hand in soft material to expose existing services..... Unit: m³

The rate shall cover the cost for removal of premix or other surfacing where necessary, excavating in all materials, shoring, backfilling, compaction and reinstatement of surfaces except for asphalt.

- PSA 8.8.4** c) Temporary protection of exposed services Unit:
Sum

The sum shall cover the cost of the protection of temporarily exposed existing services, such that the services are not damaged or subject to deterioration while they are exposed. The exposed services shall be adequately barricaded. All Health and Safety aspects shall be fulfilled.

PSA 8.8.5 Cost of Survey

DELETE THE EXISTING SUBCLAUSE AND REPLACE WITH:

- a) Survey and setting out works..... Unit:
Sum

Provision must be made to cover the complete survey of the route – water services and placement of line and level pegs by a professional surveyor every 50m and at all changes of direction and grade. The associated costs will be for the account of the Contractor. The survey shall form part of the construction programme.

The length of the route is 800 m. The Survey shall include:

Employer:		Contractor:	
Witness:		Witness:	



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- (a) Confirmation of cadastral boundaries and road reserves (whether marked by existing structures and fences or not). Setting out of pegs of cadastral boundaries
- (b) Setting out of the pipe centre line as directed by the Employer's Agent within available space, considering above
- (c) Survey of as-built pipeline and production of as built record drawings showing coordinates (X; Y; Z) at:
 - a. Each change of direction
 - b. Each valve chamber
 - c. Beginning and end of road crossings
 - d. Connection to existing pipes
 - e. 50 m spacing in straight sections and at every change in direction of the pipe.
- (d) Verifying existing servitudes including:
 - a. Indicating the servitudes on maps
 - b. Verification of ownership of servitudes
- (e) Confirming that the survey corresponds with benchmarks that may have been used by the Employer's Agent during the design stage of the works.

The tendered rate includes all costs associated with the survey (establishment, accommodation, travel, title deeds, etc.). Payment shall be effected on the completion and acceptance of the survey and setting out.

PSA 8.8.6 Special Control Water Unit: Sum

The tendered rate shall include all cost to ensure that no water enter or stand in excavated trenches, low laying areas or portions of the site under construction.

The tendered rate shall also include all cost to ensure that ingress of sub-surface water is controlled and pumped out of the excavated areas. All plant, labour and operation costs as well as equipment required to secure a dry working area and pumping of water shall be included in the tendered rate.

PSA 8.8.7 Dealing with other Service Authorities, obtaining of wayleaves, etc Unit: Sum

The Employer's Agent has obtained some of the wayleaves from identified authorities (attached to Portion 3). By the time of contract award, some of the wayleaves may have expired. The contractor will be responsible to:

- Submit applications and re-issue all wayleaves which have expired into his name;
- Submit applications and issue wayleaves that have not yet been issued into his name;

Employer:		Contractor:	
Witness:		Witness:	



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- For wayleaves that are still valid (and issued in Mariswe's name), the contractor shall issue a legal letter to Mariswe (Pty) Ltd. that he takes full responsibility for compliance with wayleave conditions;
- Maintain wayleaves throughout the duration of the contract and
- Comply with conditions.

The tender rate shall include all costs for dealing with the following service authorities and for fulfilment of way leave requirements:

- Johannesburg Water
- City Power
- City Parks
- Eskom
- Telkom
- Rand Water
- Egoli Gas
- Sasol
- Neotel
- Dark Fibre Africa
- MTN
- Citi Connect
- Johannesburg Roads Agency
- Others which may be identified.

The Contractor shall also arrange for metered connections for electricity and water for the guardhouse and a connection to the nearest sewer system.

Employer:		Contractor:	
Witness:		Witness:	



PSAB EMPLOYER'S AGENT 'S OFFICE

PSAB 3 MATERIALS

PSAB 3.1 NAMEBOARDS

DELETE THE ENTIRE CLAUSE AND REPLACE WITH:

"The name board shall be of either tempered hardboard at least 12mm thick or steel sheeting so braced on the reverse side as to prevent warping or buckling and shall be mounted on two or more firmly planted poles as necessary. The quality of the paint shall conform to SANS Standard Specification CKS 193. The colour of the paint shall conform to SANS 1091-1975 colour F11, strong blue. The Employer's SOC Ltd logo shall be in colour. The height of the larger name board shall be 2400mm and the width 4800mm, whilst the height of the smaller name board shall be 800mm and the width 1600mm".

PSAB 3.2 OFFICE BUILDING(S)

Delete this sub-clause entirely and re-title the sub-clause "FACILITIES FOR THE EMPLOYER'S AGENT "

Add the following sub-clause.

PSAB 3.2.1 Office Building(s)

The contractor shall provide, furnish and equip one or more offices (as scheduled) for the use of the Employer's Agent .

Buildings for the office shall be constructed of timber, metal sheeting or other approved materials. The building shall have double walls filled with insulating material and lined on the inside with timber or other approved material. Ceiling shall be provided and offices shall have timber or concrete floors with edge carpeting with foam-backed needle punch carpeting.

Office building shall be painted with an approved paint after erection and the paintwork shall be maintained during the contract period.

Each door shall be provided with a lock and two keys.

The siting of all offices shall be to the Employer's Agent 's satisfaction and shall be decided upon in consultation with him/her and confirmed in writing before erection.

All accommodation shall include the provision of access roads where required, fresh clean portable water and sewerage, which will be considered as part and parcel of the accommodation provided and will not be paid for separately.

All accommodation shall meet with the approval of the Employer's Agent .

The offices shall comply with the following requirements.

Employer:		Contractor:	
Witness:		Witness:	



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<u>Dimensions</u> <u>Office</u>	<u>Type 1 Office</u>	<u>Type 2</u>
Minimum floor area	20 m ²	12 m ²
Minimum window area	4.0 m ²	2.4 m ²
Minimum window area opening	2.4 m ²	1.5 m ²
Minimum clear height	2.4 m	2.4 m
Parking for vehicles	2	2

Furniture and Equipment

Each office shall be equipped with the following:

- (i) Office desk with a surface area of at least 1.5m² with at least 3 drawers one of which can be locked.
- (ii) Two office chairs.
- (iii) Sufficient racks and hangers for hanging contract drawings. The hangers shall be of the "Barhold" type, with one hanger to five drawings.
- (iv) Double 80-watt fluorescent light fittings complete with ballast and tubes (2 per Type 1 office, 1 per Type 2 office).

In addition to the above the Type 1 office shall be equipped with the following:

- (i) Conference table large enough to accommodate twelve people.
- (ii) Fifteen office chairs
- (iii) Air-conditioner
- (iv) Computer equipment as per PSAB4.1.

The Contractor must provide basic survey instruments: dumpy level, tripod stand and staff.

On completion of the Works, ownership of the buildings, furnishings and equipment shall revert to the Contractor who shall remove them from the Site.

PSAB 3.3 CARPORT

ADD THE FOLLOWING NEW CLAUSE:

"The Contractor shall construct the number of carports specified in Portion A of the Project Specifications, for the sole use of the Employer's Agent and his staff. Each carport shall be constructed so that the vehicle parked under it is always protected

Employer:		Contractor:	
Witness:		Witness:	



against the direct rays of the sun. The carport area shall be at least 20 m² and the floor shall be covered with a layer of crushed stone to alleviate dusty and muddy conditions. The carport(s) shall be positioned so as to provide easy and convenient access to the Employer's Agent's office."

PSAB 4 PLANT

PSAB 4.1 TELEPHONE

REPLACE SUBCLAUSE 4.1 OF SANS 1200 AB WITH THE FOLLOWING:

"The Contractor shall at his own cost, arrange for the provision of airtime and data bundles for the duration of the contract, for the Employer's Agent's representative. The Contractor at the tendered rates under the relevant scheduled item shall recover the associated charges and telephone calls and data bundles associated with the contract.

The Contractor shall also provide, insure, protect, secure and maintain computer facilities, for the duration of the contract, including the following:

- a laptop with a processor similar or equal to an Intel ® i3 processor, at least 4 GB Ram, a hard disk drive of at least 100 GB;
- an external hard disk drive of similar or larger capacity as the internal hard disk drive of the laptop for backups;
- an additional mouse, keyboard and screen;
- an A3 Colour printer with sufficient ink / toner, capable to scan, print, copy and fax;
- Wireless data modem;
- Data plan for at least 5GB data per month;
- Software to include Microsoft Office, Microsoft Project and a .pdf viewer.

All the equipment mentioned above will be handed back to the Contractor at the conclusion of the project."

PSAB 4.2 SURVEY EQUIPMENT

ADD THE FOLLOWING NEW CLAUSE:

The Contractor shall provide on-site and make available for the exclusive use of the Employer's Agent and his staff, the survey equipment listed in Portion A of the Project Specifications.

All survey equipment provided by the Contractor shall be in good condition, properly calibrated and fit for the purpose.

In addition to survey equipment provided by the Contractor for the exclusive use of the Employer's Agent and his staff, the Contractor shall make available for use by the Employer's Agent, the further survey equipment listed in Portion 1 of the Project

Employer:		Contractor:	
Witness:		Witness:	



Specifications, at all times when such is reasonably required by the Employer's Agent and his staff for the purposes of the Contract."

PSAB 5 CONSTRUCTION

ADD THE FOLLOWING NEW SUBCLAUSES TO CLAUSE 5 OF SANS 1200 AB:

PSAB 5.6 SURVEY EQUIPMENT

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

Where required by the Employer's Agent, the Contractor shall, at his own cost, promptly arrange for the recalibration of survey equipment provided."

PSAB 5.7 COMPUTER FACILITIES

ADD THE FOLLOWING NEW CLAUSE:

The Contractor shall, for the duration of the Contract, provide, insure, protect, secure and maintain computer facilities including the following:

- a laptop with a processor similar or equal to an Intel® i3 processor, at least 4 GB Ram, a hard disk drive of at least 100 GB;
- an external hard disk drive of similar or larger capacity as the internal hard disk drive of the laptop for backups;
- an additional mouse, keyboard and screen;
- an A3 Colour printer with sufficient ink / toner, capable to scan, print, copy and fax;
- Wireless data modem;
- Data plan for at least 5GB data per month;

All the equipment mentioned above will be handed back to the Contractor at the conclusion of the project.

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:	



PSC SITE CLEARANCE

PSC 3 MATERIALS

PSC 3.1 DISPOSAL OF MATERIALS

ADD THE FOLLOWING:

“The Contractor shall obtain his own dumping sites for the disposal of material and all transport costs shall be included in the rates tendered for site clearance.”

PSC 5 CONSTRUCTION

PSC 5.1 AREAS TO BE CLEARED AND GRUBBED

ADD THE FOLLOWING:

“Small diameter pipeline routes shall be cleared to a distance of 1,0m on both sides of the pipeline centre line and large diameter pipeline routes shall be cleared to a distance of 2,0m on both sides of the pipeline centre line. Route pegs or markers shall not be destroyed or damaged during clearing operations.”

PSC 5.2 CUTTING OF TREES

PSC 5.2.3 Preservation of trees

PSC 5.2.3.2 Individual trees

REPLACE THE LAST SENTENCE WITH THE FOLLOWING:

“An amount of R 1000.00 will be deducted from moneys due to the Contractor as a penalty for every tree that is damaged or removed unnecessarily.”

PSC 8 MEASUREMENT AND PAYMENT

PSC 8.2 PAYMENT

PSC 8.2.1 Clear and grub

REPLACE THE FIRST LINE WITH THE FOLLOWING:

“The area designated by the Employer’s Agent to be cleared and grubbed will be measured in square metre to the nearest square metre or,” otherwise specified.

PSC 8.2.5 Take down existing fences

REPLACE ITEM 8.2.5 WITH THE FOLLOWING:

PSC 8.2.5 Take down existing fences:

- (a) Description of fence Unit: m
or km

Employer:		Contractor:	
Witness:		Witness:	



(b) Etc for other items

The unit of measurement shall be the metre or kilometer of fence taken down and removed from the site.

The rate shall cover the cost of taking down the complete fence (fence height up to 2.2m) as scheduled and removing all fence material from the site, filling of holes, levelling ground surfaces and cleaning the site as well as providing temporary fence during construction."

PSC 8.2.8 Demolish and remove structures/buildings and dismantle steelwork, etc.

REPLACE "Unit: sum" WITH "Unit: sum or number of m²".

REPLACE THE LAST SENTENCE WITH:

"The rate shall cover the cost of all such separate items as scheduled in the Schedule of Quantities."

ADD THE FOLLOWING ITEMS:

PSC 8.2.11a Temporary fencing or hoarding:

- (a) Indicate temporary usage, description and type Unit: m
- (b) Etc for other usage and types.

The unit of measurement shall be the linear meter of fence or hoarding supplied and erected, and in the case of temporary fencing for maintaining and removing on completion of the works or part of the works.

The tendered rate shall include full compensation for the cost of supplying and erecting the complete fence as specified or scheduled and in the case of temporary fencing for taking down the fences, removing from the site, filling of holes, levelling ground surfaces and cleaning the site.

Seventy per cent (70%) of the tendered rate shall be payable on completion and approval of the temporary fences, and the remaining thirty per cent (30%) on completion of the removal of the fences.

PSC 8.2.11b Removal of man-made surfaces

The rate shall cover all plant, labour, material, saw cutting (asphalt and concrete), breaking up, lifting, loading, transportation, off-loading surfacing and storing (where applicable).

Unit: m²

Roadways, Asphalt and other layers

i) Asphalt (≤ 50 mm thick) and including base, sub-base and subgrades layers up to 800mm deep.

ii) Asphalt ($> 50 \leq 100$ mm thick) and including base, sub-base and subgrades layers up to 800mm deep.

a) Footways and driveways

Asphalt ≤ 50 mm thickness

Asphalt $> 50 \leq 100$ mm thickness

Employer:		Contractor:	
Witness:		Witness:	



Interlocking concrete segmental paving blocks (all colours)
 Concrete slabs (450 x 450mm)
 Brick paving
 Unreinforced concrete ≤75mm thick
 Reinforced concrete ≤75mm thick
 Grassing
 Kerbing (all types of kerbing) (Unit: m)

PSC 8.2.12 Backfilling and reinstatement of man-made surfaces

The rate shall cover the cost of all associated plant, labour, material, loading, transportation from storage, off-loading and placing (levelling and compacting where applicable) the following materials in roadways, footways and driveways in accordance with the COP:

PSC 8.2.12.1 Backfilling and reinstatement of roads

Unit:m²

a) Scenario A

- i) 150mm base – G2 Graded crushed stone to 102% Mod AASHTO density
- ii) 150mm subbase – G5 Graded crushed stone to 97% Mod AASHTO density
- iii) 150mm Fill – G7 material compacted to 95% Mod AASHTO density
- iv) 150mm selected subgrade – Insitu material compacted to 90% Mod AASHTO

b) Scenario B

- i) 150mm base – G2 material compacted to 97% Mod AASHTO density
- ii) 150mm subbase – C4 Stabilised gravel material to 95% Mod AASHTO density*
- iii) 150mm selected subgrade - Insitu material compacted to 93% Mod AASHTO

***Rate shall include stabilization agent.**

c) Scenario C (Foot paths)

- i) 150mm base – Recovered material compacted to 93% Mod AASHTO
- ii) 150mm selected subgrade – Insitu material compacted to 90% Mod AASHTO

d) Surfacing

- i) 30mm Bitumen hot –mix: Fine
- ii) 70mm Bitumen hot –mix: BTB

PSC 8.2.12.2 Backfilling and reinstatement footways

Unit:m²

a) Using removed materials:

- i) Interlocking concrete segmental paving blocks (all colours)
- ii) Concrete slabs (450 x 450mm)
- iii) Brick paving
- iv) Grassing
- v) Kerbing (Unit: m)

b) Using new supplied materials: Unit: m²

- i) 30mm Bitumen hot –mix: Fine
- ii) Interlocking concrete segmental paving blocks, including a 20mm river sand bedding layer, jointing sand (plaster sand) and mortar infill between edge restraint

Employer:		Contractor:	
Witness:		Witness:	



- and blocks
- 1) Grey blocks
 - 2) Coloured blocks
- iii) Concrete slabs (450 x 450mm) including a 20mm river sand bedding layer, jointing mortar.
 - iv) Brick paving including a 20mm river sand bedding layer, jointing sand (plaster sand) and mortar infill between edge restraint and bricks.
 - v) Unreinforced concrete $\leq 75\text{mm}$ thick (15MPa)
 - vi) Reinforced (395 mesh) concrete $\leq 75\text{mm}$ thick (15MPa)
 - vii) Grassing
 - viii) Concrete channelling, including formwork, levelling and compacting 300 x 125mm cast in situ concrete of 15MPa.
 - ix) Kerbing, including a 50mm bedding (cement and river sand), jointing mortar and 15MPa concrete haunching at all joints (Unit: m)
 - 1) Figure 1
 - 2) Figure 7
 - 3) Figure 8
 - 4) Figure 12

PSC 8.2.13 Reinstatement of existing masonry walls and steel palisade fences

The rate shall cover the cost of reinstating existing masonry walls, plastered or unplastered, and steel palisade fences (including any gates) including plant, labour, material, on-loading, transporting, off-loading and cleaning for the following:

Unit: m²

- a) Face brick
 - i) 110mm wall
 - ii) 220mm wall
 - iii) 330mm wall
- b) Plastered
 - i) 110mm wall
 - ii) 220mm wall
 - iii) 330mm wall
 - iv) 440mm wall
- c) Steel palisade fences (height = 2.2m)

Employer:		Contractor:	
Witness:		Witness:	



PSD EARTHWORKS

PSD 2 INTERPRETATIONS

PSD 2.1 SUPPORTING SPECIFICATIONS

REPLACE SUBCLAUSE 2.1.2 WITH THE FOLLOWING:

“PSD 2.1.2: Any of the other SANS 1200 Specifications may form part of the Contract Documents.”

PSD 2.3 DEFINITIONS

REPLACE THE WORD AND THE DEFINITION FOR “Borrow” WITH THE FOLLOWING:

“**Borrow material:** Material, other than material obtained from excavations required for the Works, obtained from sources such as borrow pits or the authorised widening of excavations. “Borrow” shall have a corresponding meaning.”

REPLACE THE DEFINITION FOR “Specified density” WITH THE FOLLOWING:

“**Specified density:** The specified dry density expressed as a percentage of modified AASHTO dry density.”

REPLACE THE DEFINITION FOR “Stockpile” WITH THE FOLLOWING:

“**Stockpile (verb):** The process of selecting and, when necessary, loading, transporting and off-loading material in a designated area for later use for a specific purpose.”

ADD THE FOLLOWING DEFINITIONS:

“**Commercial source:** A source of material provided by the Contractor, not the Employer, and including any borrow pit, provided by the Contractor.

Fill: An embankment or terrace constructed of material obtained from excavations or borrow pits. In roads it includes the earthworks up to the underside of the selected subgrade level.

Fill (material): Material used for the construction of an embankment or terrace.

Roadbed: The natural in situ material on which the fill, or in the absence of fill, the pavement layers, are constructed.”

PSD 3 MATERIALS

PSD 3.1 CLASSIFICATION FOR EXCAVATION PURPOSES

PSD 3.1.1 Method of classifying

ADD THE FOLLOWING:

Employer:		Contractor:	
Witness:		Witness:	



"The classification of material other than 'soft excavation' shall be agreed upon before excavation may commence.

The Contractor shall immediately inform the Employer's Agent if and when the nature of the material being excavated changes to such an extent that a new classification is warranted for further excavation. Failure on the part of the Contractor to advise the Employer's Agent in good time shall entitle the Employer's Agent to reclassify, at his discretion, such excavated material."

ADD THE FOLLOWING NEW SUB CLAUSES:

PSD 3.1.3 CLASSIFICATION FOR HAND EXCAVATION

Classification of material for various types of hand excavation will be based on the results of a dynamic cone penetrometer. The category of material shall be determined by testing the material at regular intervals and at various depths along the centre line of the trench. A minimum of 5 tests shall be done at each location and the average number of blows of the tests shall be used to determine the category of material.

The interval between test locations shall be determined by the variation of material type but shall not exceed 50m. The depth of testing shall be determined by the variation of material type and can increase or decrease in hardness with increasing depth of excavation. Table PSD 3.1.3 indicates the categories:

TABLE PSD 3.1.3: Classification for Hand Excavation

Category of Material	Consistency		DCP Blows to Penetrate 100mm	
	Granular	Cohesive	Granular	Cohesive
<u>Soft</u> Soft excavation shall be excavation in material that can be efficiently removed from the trench using a pick and shovel but not requiring prior breaking using mechanical equipment such as pavement breakers	Up to medium dense	Firm to stiff	0-6	1-5
<u>Intermediate</u> Intermediate excavation shall be excavation in material that require loosening with a hand spike (gwala) before being removed from the trench	Dense	Stiff to very stiff	7-15	6-8
<u>Hard</u> Hard excavation shall be excavation in material that requires prior breaking using mechanical equipment, such as pavement breakers with clay	Very dense		16-50	-15

Employer:		Contractor:	
Witness:		Witness:	



spades, before being removed from the trench.				
<u>Rock</u> Rock excavation shall be excavation in material other than described above which by nature of the material requires prior breaking using mechanical equipment, such as pavement breakers withmoil points, before being removed from the trench	-	-	>50	>15

PSD 3.2.3 Material suitable for backfill or fill against structures

REPLACE THE CONTENTS OF THIS SUBCLAUSE WITH THE FOLLOWING:

"Material used for backfill behind structures shall generally be the material excavated, subject to the following conditions:

- (a) The material shall not contain an excessive number of stones retained on a 50 mm sieve.
- (b) The material shall not contain large clay lumps that do not break up under the action of the compaction equipment.
- (c) The liquid limit of the material shall not exceed 40, neither shall the Pi exceed 18."

PSD 3.3 SELECTION

ADD THE FOLLOWING SUBCLAUSE:

PSD 3.3.3 Selection in borrow pits and excavations

Approval of a borrow area for a certain purpose does not necessarily mean that all the material in that area is suitable for the specified purpose. What it does mean is that the borrow area contains some suitable material. The onus shall rest on the Contractor to ensure that only material that is indeed suitable is removed and used for the specified purpose.

When the Contractor has to select excavated material for a specific purpose, the above provisions relating to borrow areas shall apply *mutatis mutandis* to excavations.

The Contractor shall not waste or contaminate material that has been selected for a specific purpose."

PSD 5 CONSTRUCTION

PSD 5.1 PRECAUTIONS

PSD 5.1.1 Safety

PSD 5.1.1.1 Barricading and lighting

Employer:		Contractor:	
Witness:		Witness:	



REPLACE “Machinery and Occupational Safety Act, 1983 (Act 6 of 1983)” WITH “Occupational Health and Safety Act, 1993 (Act 85 of 1993).”

REPLACE SUB-PARAGRAPH (a) AND (b) WITH THE FOLLOWING AND ADD SUB-PARAGRAPH c):

- a) adequately protected by a barrier or fence comprising fluorescent orange plastic netting of height at least 1 000mm and as close to the excavation as practicable; and
- b) provided with notice boards marked “CLOSED – GESLUIT” at each end of closed or partially closed roads; and
- c) provided with flashing orange lights, placed at 15m intervals along the barricading at night.

ADD THE FOLLOWING TO THIS SUBCLAUSE:

Should the Contractor fail to provide adequate lighting, signing and barricading, access to properties, or leave the site in a dangerous condition, the Employer’s Agent shall be entitled to suspend all work under the Contractor until in the Employer’s Agent’s opinion the Contractor’s obligation in these respects have been fulfilled and/or arrange for any emergency work to be carried out by some other agency and to deduct the cost of this work from any monies due to the Contractor.

PSD 5.1.1.2 Safeguarding of excavations

REPLACE “Machinery and Occupational Safety Act” IN SUB-PARAGRAPH (a) WITH “Occupational Health and Safety Act, 1993 (Act 85 of 1993).”

ADD THE FOLLOWING TO SUB PARAGRAPH (d):

Loose ground, materials, tools and appliances shall be kept clear of the edge of the excavations and a pathway at least 0,30 m shall be left clear along the edge of the excavation.

PSD 5.1.1.3 Explosives

REPLACE THE CONTENTS OF THIS SUBCLAUSE AS FOLLOWS:

Where blasting is resorted to, it shall be carried out strictly according to Explosives Act and Regulations 1956 (Act No. 26 of 1956, as amended). However, in no case will blasting be allowed if a reasonable possibility exists of injury to any foundation, wall, pipe, cable or any structure, complete or partly complete. Where the Employer’s Agent considers blasting to be dangerous, the same shall not be permitted and his decision shall be final and binding.

Wherever blasting is permitted and resorted to in the vicinity or within the limits of existing townships, roads, etc., it shall only be executed under the cover of sufficient earth backfill, heavy wire mesh screens or rubber matting of adequate weight and area to prevent the blasted material from being ejected from the trench. If any damage should occur, the Contractor shall carry out remedial work arising from such damage and will be held to have allowed therefore in his price.

Employer:		Contractor:	
Witness:		Witness:	



The Contractor shall undertake such blasting so that the Peak Particle Velocity (PPV) as measured at the closest point to the existing outfall sewer and or building structure shall not exceed 25mm/s. Each blast shall be monitored and the findings recorded by an appropriately qualified explosives expert using a suitably calibrated apparatus. The Contractor shall also timeously inform the relevant inspectorate and obtain the required blasting permit from the South African Police Services, Division of Explosives before proceeding with any blasting on site. If in the opinion of the Employer's Agent, the Contractor makes careless use of explosives, he may forbid the Contractor the use of explosives.

It is a condition that should blasting result in the disturbing of material outside the trench, the Employer's Agent will require the Contractor to remove the disturbed material and backfill it to a compaction standard of the natural in-situ material. All this work for correcting areas of disturbed material will be done at the Contractor's cost.

The schedule rate for hard rock excavation shall cover all costs incurred in connection with supply, transportation, storage and handling of explosives, the related blasting costs and any remedial work should this be required.

PSD 5.1.1.4 Hard rock excavation without using explosives

ADD THE FOLLOWING TO THIS CLAUSE:

It is a condition that should blasting result in the disturbing of structures outside the trench, the Employer's Agent will require the Contractor to remove the rock material by means of pneumatic or hydraulic breakers, e.g. jack-hammers or wood-peckers.

The schedule rate for hard rock excavation without using explosives shall cover all costs incurred in connection with supply of specialist equipment, the transportation to and from the site as well as the removal and disposal of the hard material should this be required.

PSD 5.1.2 Existing services

PSD 5.1.2.2 Detection, location and exposure

REPLACE THE CONTENTS OF SUBCLAUSE 5.1.2.2 WITH THE FOLLOWING:

"The exposure by the Contractor of underground services, as required in terms of subclause 5.4 of SANS 1200 A (as amended) shall be carried out by careful hand excavation at such positions and to such dimensions as are agreed to by the Employer's Agent .

Unless otherwise instructed or agreed by the Employer's Agent, no service shall be left exposed after its exact position has been determined and all excavations carried out for the purposes of exposing underground services shall be promptly backfilled and compacted to the following densities:

- (a) In roadways: 93% Mod AASHTO density; and
- (b) In all other areas: 90% Mod AASHTO density.

Where hand excavations to expose underground services have to be carried out in roadways, the Contractor shall reinstate the road layerworks in accordance with the provisions of subclause 5.9 of SANS 1200 DB.

Employer:		Contractor:	
Witness:		Witness:	



Payment in respect of exposing the services by means of hand excavation as described above, will be made in accordance with subclause PSA 8.8.4

Payment in respect of reinstating layerworks in roadways will be made in accordance with subclause 8.3.6.1 of SANS 1200 DB."

PSD 5.1.2.3 Protection of cables

REPLACE SUBCLAUSE 5.1.2.3 WITH THE FOLLOWING:

PSD 5.1.2.3 Protection during construction

Further to the requirements of subclause 5.4.2 of SANS 1200 A (as amended), major excavating equipment and other plant shall not be operated dangerously close to known services. Where necessary, excavation in close proximity to known services shall be carefully carried out with suitable hand tools, excluding picks wherever their use could damage the services. No additional payment will apply to such more difficult work.

Should any service not being a known service be discovered or encountered during the course of the Contract, the Contractor shall, in addition to complying with the requirements of subclause 5.4.2 of SANS 1200 A (as amended), immediately notify the Employer's Agent thereof and implement such measures as will prevent damage of such service or, if it was damaged in the course of discovery, will prevent and minimize the occurrence of any further damage occurring."

PSD 5.1.2.4 Negligence

DELETE SUB-CLAUSE 5.1.2.4

PSD 5.1.3 Stormwater and Groundwater

ADD THE FOLLOWING TO THE SUB-CLAUSE:

"The Contractor shall, where applicable and at the earliest practicable opportunity, install the permanent drainage specified or shown on the drawings and shall at his own cost provide the temporary drainage required to protect the Works."

PSD 5.1.4 Nuisance

PSD 5.1.4.3 Excavated material not to endanger or interfere

AMEND THE CLAUSE AS FOLLOWS:

"A safe, clear path shall be kept open at all times for pedestrians. Equipment, materials and waste shall be stored, stockpiled or removed in such a manner that pedestrians are not endangered and that the nuisance level is kept to a minimum. If construction activities occupy the whole footway and verge area so that pedestrians are forced to walk in the traffic lane, adequate protection from traffic shall be provided.

Where instructed by the Employer's Agent or where the Works impose a danger to traffic or pedestrians, the Contractor shall at his own cost remove off Site excavated

Employer:		Contractor:	
Witness:		Witness:	



material to temporary stockpiles (approved by the Employer's Agent) and the return to Site, excavated material for use as backfill or bedding."

ADD THE FOLLOWING NEW SUBCLAUSE:

PSD 5.1.4.4 Open Trenches

Unless otherwise permitted and where relevant, not more than the 100 m of trench in one place shall be opened ahead of the completed and backfilled pipeline."

PSD 5.1.5 Reinstatement and Maintenance of Roads

ADD THE FOLLOWING TO THE SUB-CLAUSE:

"Where crossings have been made, the roads shall be reinstated in accordance with the details specified in subclause 5.9 of SANS 1200 DB."

PSD 5.1.6 Road Traffic Control

DELETE THE SECOND SENTENCE OF SUBCLAUSE 5.1.6

PSD 5.2 METHODS AND PROCEDURES

PSD 5.2.2 Excavation

PSD 5.2.2.1 Excavation for general earthworks and for structures

ADD THE FOLLOWING TO PARAGRAPH (b):

"When the nature of the material precludes the above procedure, additional excavations shall be carried out to provide working space for the erection of formwork. The rate tendered for item 8.3.5 will be deemed to include the cost of a working width of 600 mm, but the Contractor may excavate a greater working width at no additional cost to the Employer."

REPLACE THE CONTENT OF PARAGRAPH (e) WITH THE FOLLOWING:

"Where excavations have been carried below the authorised levels, the Contractor shall backfill such excavations to the correct level with approved gravel compacted to 90% of modified AASHTO density or to the density of the surrounding material.

Where excavations have been carried out in hard material, the Employer's Agent may direct the over-excavation to be backfilled with weak concrete if there is a danger of settlement or differential settlement of the foundations.

Where the sides of excavations against which concrete is to be cast have been over-excavated or have collapsed partially, the Contractor shall re-trim the excavations if necessary and, unless other remedial measures are agreed to by the Employer's Agent , shall cast the concrete for the structure, including the additional concrete that may be required as a result of the over-excavation or partial collapse. The cost of the additional concrete or remedial measures shall be for the Contractor's account."

PSD 5.2.2.3 Disposal

Employer:		Contractor:	
Witness:		Witness:	



REPLACE THE SECOND SENTENCE WITH THE FOLLOWING:

"The Contractor shall provide all necessary spoil sites for the spoiling of all surplus and unsuitable materials and shall make the necessary arrangements with the owner of the site where the material is disposed of, and pay all charges and levies as may be applicable for the use of such spoil sites.

Every spoil site provided by the Contractor shall be approved by the local authority in whose area it is located, and the spoiling shall comply with the applicable statutory and municipal regulations as well as the requirements of the owner of the spoil site.

Payment to the Contractor in respect of locating and making arrangements for suitable spoil sites and spoiling material at such sites will be made in accordance with the provisions of subclause PSD 8.3.14."

ADD THE FOLLOWING SUBCLAUSE IN SUBCLAUSE 5.2.2:

PSD 5.2.2.4 Selection and stockpiling

Approval or designation of the material in a particular borrow pit or excavation for a particular purpose does not imply that all the material in the borrow pit or excavation is suitable for the particular purpose to which the said approval or designation relates, nor that all material in the borrow pit or source should be used for the particular purpose. The Contractor shall select suitable material from that borrow pit or source, discard unsuitable material and reserve material for other purposes as necessary.

The Contractor shall organize and carry out his operations in such a manner as will prevent the contamination of suitable embankment and backfill material with unsuitable materials. Any excavated material which becomes, in the Employer's Agent's opinion, unsuitable for use in embankments or backfill as a result of contamination, shall be disposed of in a manner acceptable to the Employer's Agent and shall be replaced by the Contractor with materials acceptable to the Employer's Agent, all at the Contractor's cost."

PSD 5.2.5 Transport for earthworks

REPLACE THE CONTENT OF SUBCLAUSE WITH THE FOLLOWING:

"The transport of all excavated materials, irrespective of the distance and source, shall be deemed to be free-haul, the cost of which is included in the Contractor's tendered rates and prices for the excavation of the materials. No separate compensation shall apply for the transportation of excavated materials."

PSD 7 TESTING

PSD 7.2 TAKING AND TESTING OF SAMPLES

REPLACE THE CONTENT OF THIS SUBCLAUSE WITH THE FOLLOWING:

"The Contractor shall arrange with the approved independent laboratory to carry out sufficient tests on a regular basis as agreed between him and the Employer's Agent to determine whether the degree of compaction, and, where applicable, the quality of

Employer:		Contractor:	
Witness:		Witness:	



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materials used, comply with the specifications and shall submit the results of these tests to the Employer's Agent in a form approved by him.

The compaction requirements for fills shall be deemed complied with when at least 75% of the dry-density tests on any lot show values equal to or above the specified density and when no single value is more than five percentage points below the specified value."

Employer:		Contractor:	
Witness:		Witness:	



PSD 8 MEASUREMENT AND PAYMENT

PSD 8.3 SCHEDULED ITEMS

PSD 8.3.1 Site preparation

REPLACE SUBCLAUSES 8.3.1.1 AND 8.3.1.2 WITH THE FOLLOWING:

“Where site preparation such as clearing, grubbing, the removal of large trees or the removal and stockpiling of topsoil is required, the provisions and scheduled items of SANS 1200 C shall apply.”

PSDB EARTHWORKS (PIPE TRENCHES)

PSDB 3 MATERIALS

PSDB 3.5 BACKFILL MATERIALS

ADD THE FOLLOWING PARAGRAPHS TO SUBCLAUSE:

“(c) Cement-stabilised backfilling

Backfilling shall, where directed by the Employer’s Agent , be stabilized with 5% cement. The aggregate shall consist of approved soil or gravel containing stones not bigger than 38 mm and with a plasticity index not exceeding 10.

The soil or gravel shall be mixed with 5% cement and shall be compacted in layers of 100 mm thick to 90% of modified AASHTO density.

“(d) Soil-crete backfilling

The aggregate for soil-crete shall be mixed with 5% cement and shall consist of approved soil or gravel containing stones not bigger than 38 mm and with a plasticity index not exceeding 10.

The soil or gravel shall be mixed in a concrete mixer with the cement and enough water to acquire a consistency that allows the mixture to be placed with vibrators to fill all voids between the pipe and the sides of the trench. Shuttering shall be used where necessary.”

PSDB 3.7 SELECTION

REPLACE THE WORDS “If he so wishes” IN THE FIRST LINE OF THE SECOND PARAGRAPH WITH THE WORDS “at his own cost.”

Employer:		Contractor:	
Witness:		Witness:	



PSDB 5 CONSTRUCTION

PSDB 5.1 PRECAUTIONS

PSDB 5.1.2 Stormwater, Seepage and Dewatering of Excavation

PSDB 5.1.2.3 Sloping ground

ADD THE FOLLOWING SENTENCE AT THE END OF THE PARAGRAPH:

"All trench excavations on sloping embankments shall be backfilled in accordance with 5.6.2 over the full extent of the actual trench excavation and to the original embankment ground level."

PSDB 5.1.3 Accommodation of traffic and access to properties

REPLACE THE SEMICOLON AND THE WORD "and" AT THE END OF THE SUBCLAUSE 5.1.3 (a) WITH A FULL STOP AND REPLACE ITEM (b) WITH THE FOLLOWING:

- (b) Where necessary to achieve compliance by the Contractor with his obligations to provide and maintain pedestrian and vehicular access to properties affected by the works, the contractor shall construct and maintain to the satisfaction of the Employer's Agent, such temporary access roads around, and/or steel or timber bridges over excavations in roads, pavements, entrances or accesses to properties.

The Contractor shall make available on site at all times a sufficient number of steel plates at least 2.0m x 2.0m x 8mm thick to be laid across open trenches to provide access to private properties. The cost of providing, placing and removing the steel plates shall be included in the rates for trench excavation.

On completion of the work, the Contractor shall dismantle and remove all such temporary constructions and reinstate these areas to their former condition.

Except only where the Employer's Agent has included in the Schedule of Quantities, particular payment items specifically therefore, the Contractor will not be paid directly for the construction and maintenance of temporary access roads and/or the provision and maintenance of bridges as aforementioned, and the costs thereof shall be deemed included in the Contractor's tendered rates for excavation."

ADD THE FOLLOWING NEW SUBCLAUSE TO SUBCLAUSE 5.1:

PSDB 5.1.5 Removal of existing pipelines

Where existing pipes have to be removed, they shall be carefully opened up by machine excavation to 300 mm above the pipes after which the whole pipe shall be fully exposed by means of hand excavation. The excavation width shall comply with subclause 8.2.3.

The pipes shall be removed from the trench in a manner approved by the Employer's Agent, and brought to the surface for inspection by the Employer's Agent.

Employer:		Contractor:	
Witness:		Witness:	



Pipes that are declared suitable for reuse and pipes declared unfit for reuse shall be dealt with in an applicable manner described in the specifications, or on the Drawings or on the Employer's Agent's instructions, as relevant."

PSDB 5.2 MINIMUM BASE WIDTHS

ADD THE FOLLOWING SUB PARAGRAPH TO:

- c) Should the excavated trench width exceed the specified side allowance on each side of the pipe of 300mm by a value greater than 300mm, remedial measures shall be as directed and shall be provided at the Contractor's cost unless it can be shown that such excess width is due to factors beyond the Contractor's control.

Trench widths should be as near vertical as possible in order to minimize the quantity of selected fill material to be provided."

PSDB 5.4 EXCAVATION

ADD THE FOLLOWING SUB CLAUSES:

PSDB 5.4.1 Principles

- "a) The cost of trimming excavations by hand or machine shall not be paid for separately but shall be included in the rates tendered for excavation.
- b) All excavated material shall be kept within defined limits and shall, wherever possible, be deposited alongside the trench. The material shall be deposited so as to leave a clear strip of at least one metre between the edge of the trench and the excavated material and shall not cause undue inconvenience to traffic and property owners. The material shall be placed and kept well clear of all manhole covers, culvert in- and outlets, fire hydrants, benchmarks, stand pegs, fences, etc.
- c) To prevent vertical trench walls from collapsing, excavated material shall, wherever possible, not be stacked on the side of any underlying strata sloping down towards the trench.
- d) Excavations more than 1,5 m deep shall be adequately shored or braced to support the overhanging material and other loads which may occur. If the Contractor is of the opinion that shoring or bracing for an excavation of depth of more than 1,5 m is not necessary, he shall notify the Employer's Agent accordingly in writing, including a report from a professional Employer's Agent or a professional technologist competent in excavations. The report shall include the relevant laboratory tests.
- e) The Contractor shall provide all the open and close timbering, strutting and shoring required for the safety of the excavations and structures adjacent to the trenches, and shall be solely and wholly responsible for ensuring the adequacy of these measures for this purpose.

Without in any way affecting or detracting from the Contractor's responsibility, the Employer's Agent shall have the right to instruct the Contractor to provide additional or improved timbering, shoring or strutting where he considers this to be necessary. The Contractor shall have no claim for additional payment on this account.

Employer:		Contractor:	
Witness:		Witness:	



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The shoring method adopted shall be compatible with the soil type and the excavating, backfilling and pipe-laying methods adopted and shall not place any undue restrictions on the laying of the pipes.

Timbering and shoring shall be left in position until the Employer's Agent has authorised their removal.

- f) Shoring and bracing may not be necessary where the Contractor elects to slope the sides of the excavation to at least the maximum angle of repose measured relative to the horizontal plane, as determined by laboratory tests. Sloping of the sides could be combined with steps. The Contractor will submit the proposed excavation profile to the Employer's Agent for approval.
- g) The cost for shoring, bracing and sloping of the sides will be included in the rates tendered for excavation. The cost for the services of a professional Employer's Agent or a professional technologist, including the relevant laboratory costs, shall be included in the tendered rates.
- h) The Safety officer, or another competent person appointed by the Contractor in writing, shall inspect every excavation, including bracing and shoring:
 - (i) daily, prior to each shift;
 - (ii) after every blasting operation;
 - (iii) after an unexpected fall of ground;
 - (iv) after substantial damage to supports; and
 - (v) after rain,
in order to pronounce the safety of the excavation to ensure the safety of persons, and those results are to be recorded in a register kept on site and made available to an inspector, the Employer, Employer's agent, contractor or employee upon request;
- i) Each excavation which is accessible to the public or which is adjacent to public roads or thoroughfares, or whereby the safety of persons may be endangered, shall be
 - (i) adequately protected by a barrier or fence of at least one metre in height and as close to the excavation as is practicable; and
 - (ii) provided with warning illuminants or any other clearly visible boundary indicators at night or when visibility is poor."

PSDB 5.4.2 Hand Excavatability

PSDB 5.4.3 Excavation of Asphalt Surfaces

The existing asphalt road surfacing shall be saw-cut prior to excavation commencing for the full width of the trench as specified on the construction drawings so as to ensure a neat finish to the reinstated surfacing.

PSDB 5.6 BACKFILLING

PSDB 5.6.1 General

Add the following after the first paragraph:

Employer:		Contractor:	
Witness:		Witness:	



Trenches shall be backfilled level with adjacent surfaces immediately after completion of pipe laying and successful pressure testing. Should pipe laying not be completed before work is due to cease for the day, the Employer's Agent shall be entitled to instruct the Contractor to backfill the trench and re-excavate it the following day in order to complete pipe laying. The cost of the above activity shall be included in the Contractor's rates for excavation.

PSDB 5.6.3 Disposal of Soft Excavation Material

DELETE THE EXISTING CLAUSE AND REPLACE WITH:

"The Contractor shall locate and negotiate for tipping sites for the disposal of surplus material and bear all costs in connection therewith. Arrangements for the consent of the owner of a property to deposit spoil and or temporary spoil thereon shall be confirmed in writing. Such arrangements shall be approved before being implemented. All spoil sites shall be neatly finished off and compacted to 90% of MOD.AASHTO density."

PSDB 5.6.6 Completion of Backfilling

ADD THE FOLLOWING:

Backfilling should not lag more than 50m behind the laying operation.

PSDB 5.7 COMPACTION

ADD THE FOLLOWING:

"Where pipelines cross existing gravel roads, backfilling shall be carried out as specified in Subclause 5.7.2 and payment therefore will be made under sub item 8.3.3.3."

PSDB 5.9 REINSTATEMENT OF SURFACES

ADD THE FOLLOWING TO THIS SUB CLAUSE:

PSDB 5.9.2 Private Property and Commonage

The ground and paved surface of servitudes, parks, driveways, roadways and sidewalks shall be reinstated to at least the standard and conditions as existed previously.

Grass sods shall be cut out from the grassed areas to be excavated and shall be set aside, preserved and kept damp until used for reinstatement. All other material to be used for reinstatement shall be suitably stored for such purpose.

The rate for reinstatement of block paved surfacing shall include all costs for the supplying and laying of the surfacing. The rate shall also cover for taking brick paving out carefully, stockpiling and replacement with new if bricks are broken or damaged. The rate must furthermore provide for all plant, labour and material costs associated with the work.

The rate for reinstatement of asphalt or concrete paved surfacing shall include all costs for the saw cutting, supplying and laying of the surfacing. The rate shall also cover for removal and spoiling of the material. The rate must furthermore provide for all plant, labour and material costs associated with the work.

Employer:		Contractor:	
Witness:		Witness:	



The width of any trench through an area paved with bricks or precast concrete units shall be the minimum practicable width that, in the opinion of the Employer's Agent, can be removed without cutting bricks or precast units.

PSDB 5.9.4 Bitumen roads: Sub-base and Base

DELETE THIS SUB CLAUSE AND REPLACE WITH THE FOLLOWING:

Johannesburg Roads Agency will reinstate all asphalt surfaces. Refer to PS 6.7.

ADD THE FOLLOWING NEW SUB CLAUSES:

PSDB 5.9.7 Construction of Layers for Footways

The reinstatement of the paving blocks shall be the responsibility of the Contractor. The reinstatement and backfilling of pavement layers shall be done in accordance with PS 6.7

ADD THE FOLLOWING NEW SUB CLAUSES:

PSDB 5.9.8 Existing Kerbs and Channels

"Where excavations have to cross existing kerbs and channels, then:

- a) In the case of a precast kerb and channel the kerb, segmented paving blocks and channel shall be carefully removed and stored so as to avoid any damage to or theft of the kerb and channel, and replaced after the excavation has been backfilled. Any damage to or theft of the kerb and channel shall be made good by the Contractor at his expense.
- b) In the case of cast insitu or extruded insitu kerb and channel the kerb and channel shall be cut with a diamond tipped saw and carefully removed so as to avoid any damage to the remaining kerbs and channels. After the excavation has been backfilled the portion of kerb and channel removed shall be replaced with a cast insitu kerb and channel of the same profile as the existing kerb and channel."

ADD THE FOLLOWING NEW SUB-CLAUSE:

PSDB 5.11 LOCATION OF EXISTING SERVICES

Positions and details of known existing services as received from the various Departments are indicated on the Construction Drawings. Exact positions cannot be guaranteed by The Employer's who will not be held responsible for any damages to any services. The Contractor shall excavate by hand to locate any such services and ensure that care is taken not to damage these services.

ADD THE FOLLOWING NEW SUB-CLAUSE:

PSDB 5.12 DEALING AND PROTECTING EXISTING SERVICES

All existing services, underground as well as above ground level, shall be protected by the Contractor in an appropriate manner, for the duration of the construction or as deemed necessary by the Employer's Agent, such that no damage to or interruption of the services shall occur.

Employer:		Contractor:	
Witness:		Witness:	



ADD THE FOLLOWING NEW SUB-CLAUSE:

PSDB 5.13 GAS MAIN, ELECTRICITY AND TELECOMMUNICATION POLES

Gas mains, electricity and telecommunication poles along the pipe route are to be stabilised and protected prior to excavation and for the duration of construction.

ADD THE FOLLOWING NEW CLAUSE:

PSDB 5.14 TREES IN CONSTRUCTION PATH

Whenever possible any trees that lie within the construction path, shall not be removed and care shall be exercised to avoid damaging them. If the Contractor considers the removal of any tree unavoidable he/she shall obtain in writing the approval of the Employer's Agent and the Environmental Consultant prior to removal of any trees. Rates to cover removal and replacement where practical are provided in the schedule of quantities. A penalty of R1, 000.00 will be applied for any unauthorized or unnecessary damage to any tree which in the opinion of the Employer's Agent could have been avoided.

ADD THE FOLLOWING NEW SUBCLAUSE 5:

PSDB 7 TESTING

ADD THE FOLLOWING NEW SUBCLAUSE:

PSDB 7.2 Inspection at Intermediate Stages of Construction

The Contractor shall call the Employer's Agent , giving him reasonable notice, to inspect the works at the following intermediate stages of construction:

- a) After completion of the trench excavation and preparation of the trench bottom and before any pipe is laid.
- b) After the selected backfill material has been placed around the pipe and before the remainder of the trench is backfilled.
- c) Before placing of premix on roads or any final surfacing on constructed footways. Work shall not progress through the specified stages without the approval of the Employer's Agent or his representative on site.

Failure to comply with the provision of this clause shall result in the suspension of the backfilling work until the testing has been approved by the Employer's Agent ."

PSDB 8 MEASUREMENT AND PAYMENT

PSDB 8.1 BASIC PRINCIPLES

ADD THE FOLLOWING PRARGRAPH:

"The basic principle of measurement and payment for earthworks for a pipe trench is that the rates tendered for excavation shall also cover the cost of trimming, handling and shoring or bracing as specified in clause PSDB 5.4".

Employer:		Contractor:	
Witness:		Witness:	



PSDB 8.3 SCHEDULED ITEMS

PSDB 8.3.2 Excavation

- a) Excavate in all materials, for trenches, backfill compact and dispose of surplus material

ADD THE FOLLOWING SUB-ITEM:

The rate shall also cover the cost of excavating for trenches using labour intensive construction methods. The rate shall exclude the cost of removal of grass sods and compaction but shall include for the disposal of surplus/unsuitable material. The rate shall, in addition, cover the costs for compliance with the requirements of PSDB 5.4.1.

- b) Extra over item (a) above for:

ADD THE FOLLOWING AT THE END OF THE EXISTING SUB-ITEM 2:

"No payments will be made under sub items (1) and (2) in respect of any materials measured and paid for under sub item 3 below."

AND ADD THE FOLLOWING NEW SUBITEMS IN 8.3.2(b):

- "(3) Hand excavation and backfill where ordered by the Employer's Agent
Unit: m³

The unit of measurement shall be the cubic metre of material, measured in place according to the authorised dimensions, which was excavated by the hand on the specific prior written instructions of the Employer's Agent ; provided always that the Employer's Agent 's said instruction shall have stated that measurement and payment for such hand excavation will be in accordance with this item.

The tendered rate shall include full compensation for the additional cost, effort and time resulting from excavating in the respective materials using hand methods only.

The Employer's Agent shall not be obliged to authorise payment under this item in respect of any hand excavation carried out (whether ordered in writing or otherwise), which hand excavation was in any case necessary to achieve compliance by the Contractor with his obligations under the Contract to

- (i) utilise construction appropriate to the nature of the specific parts of the works; and/or
- (ii) protect existing structures and/or services; and/or
- (iii) comply with all prevailing legislation and regulations.

- (4) Cutting of premix and concrete surfaces Unit: m²

The cutting of premix and concrete surfaces shall be measured per square metre of cut as scheduled. Cutting of premix and concrete surfaces shall be done with a diamond tipped saw or by some other approved method. The depth of the cut shall be such that the adjoining premix and concrete surfaces are not disturbed

Employer:		Contractor:	
Witness:		Witness:	



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when excavation takes place. The cutting of surfaces shall be done 100mm on either side of the trench.

- (5) Backfill stabilised with 5% cement where directed by the Employer's Agent
.....Unit: m³

The unit of measurement shall be the cubic metre of backfill material, measured in place after compaction according to the authorised dimensions, which was stabilised on the Employer's Agent's instructions in accordance with subclause PSDB 3.5(c).

The tendered rate shall include full compensation for supplying the cement and for selecting, mixing, backfilling and compacting the stabilised material to 90% of modified AASHTO density.

- (6) Soil-crete backfill where directed by the Employer's Agent
.....Unit: m³

The unit of measurement shall be the cubic metre of soil-crete placed on the Employer's Agent's instructions in accordance with subclause PSDB 3.5(d), measured in place according to the authorised dimensions.

The tendered rate shall include full compensation for supplying the cement and for selecting, mixing and placing the soilcrete as well as for the cost of shuttering if required."

Employer:		Contractor:	
Witness:		Witness:	



PSDB 8.3.3 Excavation ancillaries

PSDB 8.3.3.3 Compaction in road reserves

REPLACE THE HEADING OF THIS SUBITEM WITH THE FOLLOWING:

“PSDB 8.3.3.3.3 Compaction in road crossings”

REPLACE THE SENTENCE, “The volume will be measured as specified in 8.2.2, 8.2.3 and 8.3.3.1”, WITH THE FOLLOWING:

“To determine the volume in the case of gravel roads, the depth will be measured from the underside of the gravel wearing course to the top of the fill blanket, and in the case of bitumen roads, from the underside of the subbase to the top of the fill blanket.

The rest of the trench shall be backfilled as specified in clauses 5.9.3, 5.9.4 and 5.9.5, as applicable, and payment will be made under item 8.3.6.1.”

PSDB 8.3.3.4 Overhaul

REPLACE THE CONTENTS OF THIS ITEM WITH THE FOLLOWING:

“Measurement and payment shall be in accordance with subclause PSD 5.2.5.”

PSDB 8.3.4 Particular items

PSDB 8.3.4(a) Shore trench opposite structure or service

REPLACE THE HEADING OF THIS SUBITEM WITH THE FOLLOWING:

PSDB 8.3.4(a) Shore trench opposite structure or service for depths:”

ADD THE FOLLOWING AFTER THE LAST SENTENCE:

“Separate items will be measured for depths of trenches in increments of 1 m. The rate for each stated category shall cover the cost of shoring from ground level up to the full depth of the stated category. Payment for this item will only be made if written instructions were issued by the Employer’s Agent over and above the Standard Specifications for safety of excavations as specified in SANS 1200 DB, subclause 5.1.”

PSDB 8.3.4(b) Temporary works: Control water inflow from to

REPLACE THIS SUBITEM WITH THE FOLLOWING:

PSDB 8.3.4(b) Accommodation of existing flows for temporary or permanent connections or construction of new structures or pipe trenches:

- 1) (Description of item stated) Unit:
Sum
- 2) Etc for other structures

Employer:		Contractor:	
Witness:		Witness:	



The tendered sums shall include full compensation for any inconvenience suffered, for normal and exceptional risks, for unforeseen eventualities and for maintaining the accommodated flow as long as necessary and shall include for the design and construction of all necessary temporary measures such as additional clearing, grubbing, earthworks, culverts, structures, pipework, pumping, cleaning up and any other associated work that may be required as specified in Clause PS1.5. Where a temporary structure for the accommodation of an existing flow has been designed by the Employer's Agent and is to be constructed by the Contractor, payment for such structure shall, unless otherwise stated in the scheduled item, be made under the applicable sub items in this payment item."

PSDB 8.3.5 Existing services that Intersect or Adjoin a Pipe Trench

PSDB 8.3.5 a) Services that intersect a trench

ADD TO THE FIRST SENTENCE OF THIS SUB CLAUSE AS FOLLOWS:

After "Except where water pipes are to be recovered" add "and water leads for erf connections need to be renewed"

ADD THD NEW SUBCLAUSE PSDB 8.3.5 c) TO CLAUSE 8.3.5 AS FOLLOWS:

PSDB 8.3.5 c) Services that require special care

1)	Description	of	
	service	Unit: No	
2)	Etc	for	other
	items	Unit: No	

The Unit of measurement shall be the number of each service described. Electricity, telecommunication poles and water mains along the pipe route are to be stabilised and protected prior to excavation and for the duration of construction. The rate shall cover the temporary stabilization and protection of electricity and telecommunication poles.

ADD THD NEW SUBCLAUSE PSDB 8.3.6.2 TO CLAUSE 8.3.6 AS FOLLOWS:

PSDB 8.3.6.2 Reinstatement of surfacing for footways

a)	Brick paving	
	Unit: m ²	
b)	Concrete paving	
	Unit: m ²	
c)	Concrete slabs	
	Unit: m ²	

The Unit of measurement shall be square meter of a reinstated surface. The rate for reinstatement of footway surfacing shall include all costs for careful removal, replacement of damaged sections and laying of the surfacing using labour intensive construction methods. The rates shall include for the lifting, stockpiling and replacement of broken or damaged bricks, blocks or slabs and shall provide for all plant, labour and material costs associated with the work.

Employer:		Contractor:	
Witness:		Witness:	



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The width of any trench through an area paved with bricks or precast concrete units shall be the minimum practicable width which, in the opinion of the Employer's Agent, can be removed without cutting bricks or precast units.

ADD THE NEW SUBCLAUSE PSDB 8.3.6.3 TO CLAUSE 8.3.6 AS FOLLOWS:

PSDB 8.3.6.3 Reinstatement of kerbs and channels Unit: m²

The unit of measurement shall be square metre of area reinstated. The rate shall cover the cost of all labour, plant and material required and shall also include for the disposal of all unsuitable materials.

ADD THE NEW SUBCLAUSE PSDB 8.3.6.3 TO CLAUSE 8.3.6 AS FOLLOWS:

PSDB 8.3.6.4 Reinstatement of grassed surfaces Unit: m²

The unit of measurement shall be square metre of area reinstated. The rate shall cover the cost of careful removal of grass sods to a minimum depth to a minimum depth of 100mm, stockpiling, maintenance for later re-use and reinstatement thereof."

DELETE THIS SUBCLAUSE AND REPLACE WITH THE FOLLOWING:

PSDB 8.3.6.5 Reinstatement of recreational areas

- a) Description of recreation..... Unit: m
- b) Etc for other items

The unit of measurement shall be the metre of fence reinstated complete. The rate shall cover the full compensation, labour, material and ancillary works for the reinstatement.

Employer:		Contractor:	
Witness:		Witness:	



PSDK GABIONS AND PITCHING

PSDK 3 MATERIALS

PSDK 3.2 Pitching

PSDK 3.2.1 Stone

REPLACE THE CONTENTS OF TABLE 2 WITH THE FOLLOWING:

“TABLE 2 SIZE AND MASS OF INDIVIDUAL STONES FOR PITCHING

1	2	3	4
Size/mass of pitching	Thickness of pitching Mm, min	Least dimension Mm, min	Mass kg, min
Extra heavy	600	300	180
Heavy	400	190	50
Medium	300	150	27
Light	200	110	11

PSDK 5 CONSTRUCTION

PSDK 5.3.3 Grouted pitching

REPLACE THE WORDS “(Table 4)” IN THE SECOND LINE OF THE FIRST PARAGRAPH WITH “(Table 2)”

Employer:		Contractor:	
Witness:		Witness:	



PSG CONCRETE STRUCTURAL

PSG 3 MATERIALS

PSG 3.2 CEMENT

PSG 3.2.2 Alternative types of cement

REPLACE THE CONTENTS OF THIS SUBCLAUSE WITH THE FOLLOWING:

“Only sulphate resistant cement shall be used on this project.

If the Contractor wishes to use any other type of cement, he shall obtain the Employer's Agent's prior written approval (see 8.1.3.2 and 8.1.3.3.) The tendered rates, however, shall be based on the use of sulphate resistant cement only”.

PSG 3.2.3 Storage of cement

ADD THE FOLLOWING:

“Cement shall not be stored for longer than 12 weeks without the Employer's Agent's permission”.

PSG 3.4 AGGREGATES

ADD THE FOLLOWING SUBCLAUSE:

PSG 3.4.4 Aggregate of dolomitic origin

All aggregates for structural concrete, manholes, pipe encasement, pipe bedding cradles, mass filling, etc. shall be of dolomitic origin. The quantity of insoluble matter in respect of concrete made with aggregates of dolomitic origin, determined according to the method described in SANS 677, Appendix C, shall not be more than 15%.

PSG 4 PLANT

PSG 4.1 GENERAL

ADD THE FOLLOWING SUBCLAUSE

PSG 4.1.1 Minimum Plant

The contractor shall have the following minimum Plant available and in sound working order:

- (a) Two concrete mixers, each of sufficient capacity to complete a section of the wall between horizontal construction joints within 4 hours and without interruption;
- (b) Two concrete vibrators, at least one of which shall be powered by an internal combustion engine;
- (c) One air compressor;

Employer:		Contractor:	
Witness:		Witness:	



- (d) Storage tanks at the water carts or trucks are adequate capacity to ensure that sufficient water will be available before commencement of every major concrete-placing operation.

If the Plant used for placing concrete for the structure of electrically or mechanically powered, the Contractors shall also provide some other approved, non- electrically powered standby means for placing concrete at an adequate rate in the event of a power or mechanical failure of the main Plant.

When the Contractor elects to place a crane inside the walls of the structure during the construction period, shall communicate with the Employer's Agent in good time to ensure that the design and layout of the panels that form the roof slabs and floor allow for such positioning of the crane. When sections of the roof and floor have to be redesigned to accommodate the crane, the redesigned cost shall be borne by the Contractor.

PSG 4.5 FORMWORK

PSG 4.5.1 Design

ADD THE FOLLOWING:

All form work with scaffolding required for any part the works shall be designed by the Contractor, and before commencing with the erection of any formwork or scaffolding, the Contractor shall submit the methods he proposes to use to the Employer's Agent for approval. The Employer's Agent has the authority to order alterations to the design or the sizes of any part of the formwork or scaffolding. The Contractor shall check the safety and suitability of all such alterations. The fact of the Employer's Agent has approved or altered any part of the formwork or scaffolding shall not be construed as relieving the Contractor of his responsibility with regard to the strength and stability of the formwork or scaffolding.

PSG 4.5.3 Ties

ADD THE FOLLOWING:

"No plugs, bolts, ties or clamps of any description used to hold formwork will be allowed into the project or through the concrete unless expressly approved by the Employer's Agent .

Only approved tie-rods consisting of solid rods (that remain embedded in the concrete) and with removable ends shall be used to hold the formwork of the walls. The removable tie-rod ends shall facilitate removal without damage to the concrete, and no permanently embedded parts of such tie-rods shall have less than 50mm of cover to the finished concrete surface.

The cavities left in the concrete when the tie-rod end cones are removed shall soundly caulked with a cement mortar to which an approved shrinkage-reducing agent has been added, and shall be neatly to finished to a smooth surface uniform with that of the surrounding concrete.

The cost of supplying special tie-rods as well as the filling of the cavities left by the tie-rod cones shall be included in the rates tendered for formwork under the appropriate pay items.

Employer:		Contractor:	
Witness:		Witness:	



On no account shall formwork be secured to reinforcing bars”.

PSG 5 CONSTRUCTION

PSG 5.1 REINFORCEMENT

PSG 5.1.2 Fixing

ADD THE FOLLOWING:

“The Employer’s Agent will inspect the reinforcing after it has been fixed in place, the formwork has been cleaned, cover blocks have been positioned, and before concreting commences.

Welding of reinforcing steel will not be permitted”.

PSG 5.1.3 Cover

ADD THE FOLLOWING:

“The distance between pipes in the reinforcing steel shall nowhere be less than:

- (a) 40 mm or
- (b) 5 mm plus the maximum size of the coarse aggregate, whichever is the largest

PSG 5.2 FORMWORK

PSG 5.2.5 Removal of formwork

ADD THE FOLLOWING SUBCLAUSE:

PSG 5.2.5.6 The Contractor shall make provision for the continued support of beams and slabs while the formwork is being removed and/or for that propping of beams and slabs”.

PSG 5.3 HOLES, CHASES AND FIXING BLOCKS

ADD THE FOLLOWING:

“Cover blocks for reinforcing and fixtures may be placed into the concrete provided that neither the strength nor any other desirable characteristics (such as the appearance) of the concrete section is affected or impaired in the opinion of the Employer’s Agent .

The holes or cavities left by the ferrule heads in the concrete of water-retaining structures shall be filled with an approved non-shrink grout applied strictly in accordance with the manufacturer’s specifications.”

PSG 5.4 PIPES AND CONDUITS

ADD THE FOLLOWING:

Employer:		Contractor:	
Witness:		Witness:	



"All pipes passing through to concrete floors, walls or slabs shall be cast into a concrete member simultaneously with the casting of the member. Openings for pipes shall only be left in concrete members when so directed by the Employer's Agent or when shown on the drawings. Pipes shall be installed in such openings according to the details shown on the drawings.

If water tightness is a requirement where pipes are cast into walls, floors and slabs, the Contractor shall ensure water tightness where smooth-surfaced pipes are used by using an approved method such as tape wrapping the pipes prior to casting in. The cost of such method will be deemed to be included in the rates tendered for item PSG 8.10".

PSG 5.5 CONCRETE

PSG 5.5.1 Quality

PSG 5.5.1.5 Durability

The exposure conditions of the concrete are classified as "severe".

PSG 5.5.1.7 Strength concrete

ADD THE FOLLOWING:

"The concrete mixes for sulphate resistant cement shall be designed by an approved laboratory for approval by the Employer's Agent before commencement of any concrete work".

PSG 5.5.3 Mixing

PSG 5.5.3.2 Ready-mixed concrete

ADD THE FOLLOWING:

"Ready-mixed concrete may be used on the Site. The contractor shall take samples for testing from every load delivered to the Site".

PSG 5.5 5 Placing

ADD THE FOLLOWING SUBCLAUSE:

PSG 5.5.5.10 "Concreting of the wall between horizontal construction joints shall be carried out in both directions from a point on the wall in order to close the gap with fresh concrete".

PSG 5.5.7 Construction joints

ADD THE FOLLOWING:

"Horizontal construction joints are permitted in structure walls in positions indicated on the drawings or approved by the Employer's Agent . Vertical construction joints in the wall are subject to the written approval of the Employer's Agent and the cost of all

Employer:		Contractor:	
Witness:		Witness:	



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such vertical or horizontal construction joints will be deemed to be included in the rates for cast-in-situ concrete. This also applies to the preparation of concrete to form construction joints in the flume walls as specified on the drawings.

The construction joints in water-retaining structure shall be made strictly in accordance with the details shown on the drawings. The joints between screeds and concrete floors shall be regarded as construction joints and the surface of the floor shall be prepared as described for construction joints.

Should the Contractor's method of construction necessitate the placing of construction or other joint in a position not shown on the drawings, such method of construction and position of the joint shall be approved by the Employer's Agent in writing. The cost of such joint shall be included in the tendered rates and shall include scrubbing of the concrete where steel reinforcement is continuous.

The walls shall be cast in lifts of height that permits each lift to be poured without interruption in one continuous operation during working hours.

It is the Contractor's responsibility to ensure that construction joints are watertight. The Contractor's proposed method for ensuring the watertightness of such joints shall be submitted to the Employer's Agent for his approval.

For construction joints at kickers all additional costs for concrete, preparation, etc will be deemed to be included in the rates tendered for concrete in walls or sides and kicker joints or construction joints will not be measured separately".

PSG 5.5.8 Curing and protection

ADD THE FOLLOWING:

"Curing by retaining the formwork in place or by covering with a waterproof membrane are the curing methods strongly recommended. Concrete will not be paid for unless properly cured and proof of curing is continuously visible on the Site".

PSG 5.5.11 Watertight concrete

ADD THE FOLLOWING:

"The minimum cement content in water-retaining structures shall be 325 kg/m³, and the maximum cement content shall be 450 kg/m³ in reinforced concrete."

The maximum water cement ratio for water-retaining structures shall be more 0, 50".

ADD THE FOLLOWING SUBCLAUSE:

PSG 5.5.16 Soilcrete

Where soilcrete is specified for filling under floor slabs the soilcrete shall comply with the requirements of subclause PSDB 3.5 (d) of section 1200 DP as amended and shall be placed as specified in this subclause.

Employer:		Contractor:	
Witness:		Witness:	



PSG 6 TOLERANCES

PSG 6.2 PERMISSIBLE DEVIATIONS

PSG 6.2.3 Specified permissible deviations

ADD THE FOLLOWING:

“Degree of accuracy II is applicable

Every specified permissible deviation is binding in itself. The cumulative effect of permissible deviations will not be considered. The maximum permissible vertical deviation is subject to the other permissible deviations”.

REPLACE SUBCLAUSE 6.2.3 (D)(5) WITH THE FOLLOWING:

	Permissible deviation		
	Degree of accuracy		
	III	II	I
	mm	mm	mm
“Vertically, per metre of height	5	3	2
Subject to a maximum	50	30	10

PSG 7 TESTS

PSG 7.1 FACILITIES & FREQUENCY OF SAMPLING

PSG 7.1.1. Facilities

ADD THE FOLLOWING:

“The Contractor shall provide sufficient storage capacity for the concrete cubes and shall arrange to have them tested by an approved laboratory.

The cost all testing, including the cost of sampling, storage and transporting samples should be included in the rates tendered for concrete work”.

PSG 7.3 ACCEPTANCE CRITERIA FOR STRENGTH CONCRETE

ADD THE FOLLOWING:

“Test results obtained from the supplier of ready-mix concrete will not be accepted for evaluation in terms of subclause 7.3, but samples for testing shall be taken off such concrete at the point of placing “.

ADD THE FOLLOWING SUBCLAUSE:

PSG 7.3.6 Testing for watertightness

Water for testing shall be provided by the Contractor and shall be responsible for providing all necessary equipment that may be required for filling the structures.

The structure shall be filled with water at a uniform rate not exceeding 2.0 m in 24 hours until the top water level been reached. The water level will then be carefully

Employer:		Contractor:	
Witness:		Witness:	



noted and recorded by the Employer's Agent in relation to a fixed benchmark, and shall be contained by the addition of further water for a sterilising period to permit complete absorption of water by the concrete.

The sterilising period may be 7 days for a maximum design crack width of 0.1mm or 21 days for 0.2mm or larger. After the sterilising period, the level of the liquid surface shall be recorded at 24-hour intervals for a test period of 7 days. During the 7 day test period the total permissible drop in level, after allowing for evaporation shall not exceed 1/500 the one of the average water depth of the full tank, or 10 mm.

The evaporation shall be measured by the mean drop in level caused by the evaporation of the water in three flat containers floating in the water being recorded.

In the event of appreciable leakage being evident at any of the stages of the filling or testing or the event of the Employer's Agent considering the final degree of water tightness to be unsatisfactory, the contractor when ordered by the Employer's Agent shall discontinue such filling or testing and shall, at his own expense, take approved steps immediately to rectify the leakage, until a satisfactory test is obtained, which shall prove to the Employer's Agent that a sufficient degree of watertightness has been obtained.

The cost of emptying a water-retaining structure which cannot be drained shall be borne by the Contractor. The water shall be discharged in a manner approved by the Employer's Agent and shall be such that the employer can utilise the water is he so desires.

The water shall not be used as a medium for additives to affect remedial work or to stop leaks.

The cost of retesting the structure for watertightness shall be borne by the Contractor".

PSG 8 MEASUREMENT AND PAYMENT

PSG 8.1 MEASUREMENT AND RATES

PSG 8.1.1 Formwork

DELETE "or splays over 20 mm x 20 mm" FROM THE FIRST LINE OF PARAGRAPH 8.1.1.2

ADD THE FOLLOWING PARAGRAPH 8.1.1.2

"Splays up to and including 25 mm x 25 mm will not be measured separately and will be deemed to be included in the formwork costs".

ADD THE FOLLOWING PARAGRAPHS

"8.1.1.7 For construction joints at kickers (joint F), all additional costs for formwork to edges up to 300 mm high will be deemed to be included in the rates tendered for vertical formwork to sides of walls and will not be measured separately in narrow width.

Employer:		Contractor:	
Witness:		Witness:	



- 8.1.1.8.1 No formwork will be measured to edges of blinding layers under structures and the cost thereof (if needed), will be deemed to be included in the rates tendered for concrete in blinding layers.
- 8.1.1.8.2 Back-shuttering or formwork to top revealed surfaces of sloping - or conical formwork will only be measured to surfaces over 40° and 85° to the horizontal.
- 8.1.1.8.3 Formwork to horizontal surfaces in pump stations, valve chambers, man holes or sumps can either be removed through the manhole cover opening or the Contractor may use permanent formwork at his own cost as no claims in this regard will be considered".

PSG 8.1.2 Reinforcement

REPLACE THE CONTENTS OF THIS SUBCLAUSE WITH THE FOLLOWING:

"The unit of measurement for steel bars shall be the ton of reinforcement in place, in accordance with the Drawings or as authorised by the Employer's Agent .

The unit of measurement for welded steel fabric shall be the kilogram of fabric reinforcement in place, and the quantity shall be calculated from the net area covered by mesh, excluding overlaps.

Clips, ties, separators, stools and other steel used for positioning reinforcement will not be measured, unless these are shown on the bending schedules.

The tendered rate shall include full compensation for the supply, delivery, cutting, bending, welding, placing and fixing of the steel reinforcement, including all tying wire, stools, supports and waste".

PSG 8.1.3 Concrete

Delete "or the plank size of the excavation where additional excavation is provided to facilitate erection of forms" from the second line of paragraph 8.1.3.1(c).

PSG 8.1.4 Metal work

8.1.4.1 Door

The tendered rate includes the supply and installation of a purpose made double steel door frame and double door complete with locking device, built into the wall as indicated on the drawings. The rate shall include all handles, bolts and locks. The door shall make allowance for the crawl beam. The door and frame shall be manufactured from 1.6 mm mild steel. The hinges shall be 100mm heavy duty. The door without the pull handle shall be fitted with lockable bolts, both top and bottom. The rate shall include the supply of two padlocks with common key. The door and frame shall be painted after installation as follows: 2 x coats of universal undercoat and 2 x coats of white enamel. Payment shall be made on completed and approved construction only.

Employer:		Contractor:	
Witness:		Witness:	



8.1.4.2 Crawl beam

The rate shall include the supply and installation of a crawl beam, as indicated on the drawings. The crawl beam shall be hot dipped galvanized. All labour, plant, material, specials and ancillary costs required to fix the crawl beam to the roof of the building shall be included in the tendered rate. Measurement shall be per number of beams. Payment shall be made on completed and approved construction only.

8.1.4.3 Crawl beam support

The rate shall include the supply and installation of an external support for the crawl beam, as indicated on the drawings. The support for crawl beam shall be hot dipped galvanized. All labour, plant, material, specials and ancillary costs for the fixing of the support shall be included in the tendered rate. Measurement shall be per number of supports installed. Payment shall be made on completed and approved construction only.

8.1.4.4 Windows

The rate shall include the supply and installation of stock residential type steel windows of type indicated on drawings, including glazing, sills and burglar bars. Burglar bars shall be heavy duty and 15 mm diameter. The bars shall have at least a penetrating of depth of 100 mm in the lintels and sills. Loose burglar bars shall be site welded to the window frames. Payment shall be made on completed and approved construction only.

8.1.4.5 Steel staircase

The rate shall include the supply and installation of a steel staircase with hand rails on both sides, as indicated on the drawings. All labour, plant, material, specials and ancillary costs for the fixing of the support shall be included in the tendered rate. Payment shall be made on completed and approved construction only.

Employer:		Contractor:	
Witness:		Witness:	



PSL MEDIUM-PRESSURE PIPELINES

PSL 2 INTERPRETATIONS

PSL 2.4 ABREVIATIONS

ADD THE FOLLOWING:

HDPE: High density polyethylene

mPVC : Modified Polyvinyl chloride

PSL 3 MATERIALS

PSL 3.1 GENERAL

ADD THE FOLLOWING TO CLAUSE:

The contract specifications for materials and construction activities will conform to SANS 1200, SANS 1914-5 and Johannesburg Water requirements. The project specifications will include specific items to ensure proper implementation, control reporting on labour based construction and methods as included in the specifications.

Materials for this contract should preferably be obtained from manufacturers who operate an effective quality management system such as that described in SANS 0157 or ISO 9000.

PSL 3.4 STEEL PIPES, FITTINGS, AND SPECIALS

PSL 3.4.3 Pipes of nominal bore over 150mm

OMIT PARAGRAPH (C) AND INSERT THE FOLLOWING:

"Steel pipes and fittings shall be manufactured in accordance with API 5L X52 with a wall thickness of 12mm; 10mm, 8mm or 6mm, depending on the section of pipe in question. External lining to be FB MDPE (Sintakote 2) (or other as specified by the Employer) and internal lining to be SF Epoxy with a target thickness of 600 microns. Pipe lengths to be 12.192 m.

Straight joints and bends to be fillet welded on site.

The pipe manufacturer shall submit to the Employer's Agent the steel maker's certificates covering all steel used. These certificates shall indicate the process of manufacture, the chemical analysis and the physical properties of the steel except that, at the option of the pipe manufacturer, the physical properties of the steel may be determined from specimens taken from finished pipe."

PSL 3.7 OTHER TYPES OF PIPES

PSL 3.7.1 uPVC Pipes

ADD THE FOLLOWING TO THE SUB CLAUSE

Employer:		Contractor:	
Witness:		Witness:	



"uPVC Pipe's systems shall conform to SANS 966-1998Part1 or II as applicable and have integral pipe end sockets of the rubber ring joint type. All uPVC - pipes shall be in 6m lengths. Fittings and specials for uPVC pipes shall be manufactured in Grade 14 cast iron, rated to at least 1600kPa working pressure. Unless otherwise specified fittings and specials shall be bitumen dipped.

PSL 3.7.2 Polyethylene Pipes

REPLACE THE SUBCLASE WITH THE FOLLOWING

"HDPE pipes of diameter up to and including 63 mm shall conform with SANS 4427 Part 2 for Type IV pipes. HDPE pipes greater than 63 mm shall conform with SANS 4427 Part 3 for Type V pipes. Unless otherwise specified, pipes shall be Class 16 and plain ended for butt welding".

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.7.3 High Impact uPVC Pipes

Class 16 uPVC pipes shall conform to SANS 1283 (alternatively ISO 4422) shall be used unless otherwise indicated. Jointing shall be effected by means of approved "press-on" shouldered ends and cast iron and steel victaulic clamps. Unless otherwise specified, pipes shall be Class 16.

Where the cutting of any pipe is necessary, shouldered ends shall be fixed to the pipe by means of an approved machine capable of clamping the pipe without causing any damage to the pipe and pressing on the shouldered end by means of a hydraulic operated jack applying a uniform axial force to locate the shouldered end truly in position. The use of impact force to either the pipe or shouldered end will not be permitted. No on-site fixing of shouldered ends shall be permitted."

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.7.4 mPVC Pipes

High Impact mPVC Class 16 and shall conform to SANS 1283 for diameter up to and including 315mm with a fully end load restraint coupling system approved by Johannesburg Water.

PSL 3.8 JOINTING MATERIAL

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.8.2 Flexible couplings

OMIT THE EXISTING CLAUSE AND INSERT THE FOLLOWING:

"All flexible couplings shall be "Viking Johnson" couplings without centre register, or approved similar.

Rubber rings shall be of the wedge-type and shall be manufactured from natural or synthetic rubber only. Reclaimed rubber shall not be used in the manufacture of the rubber rings."

Employer:		Contractor:	
Witness:		Witness:	



PSL 3.8.3 Flanges and accessories

ADD THE FOLLOWING TO THE EXISTING CLAUSE:

"The dimensions and drilling of standard flanges shall comply with the requirements of SANS 1123 and SANS 1476 for a working pressure as specified. Flanges shall be machined flat, i.e. without a raised joint face. Puddle flanges shall have the same dimensions as standard flanges but shall be undrilled.

Faces of flanges which will be in contact with jointing gaskets shall receive a protective coating of such thickness and consistence as will not impair the air/gas/water tightness of the joint."

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.8.8 Victaulic joints

Joints for uPVC and medium steel pipelines shall conform to SANS 815: Standard specifications for shouldered end pipes, fittings and couplings.

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.8.9 HDPE Pipe joints

Joints for HDPE pipe shall be by means of welding or electro fusion, welded flanges or approved external compression type fittings (Plasson or similar approved)."

Employer:		Contractor:	
Witness:		Witness:	



PSL 3.9 CORROSION PROTECTION

PSL 3.9.2 Steel pipe

ADD THE FOLLOWING TO THE EXISTING CLAUSE:

"All coating and linings shall be completed strictly to the publication "Corrosion Protection for Civil, Mechanical and Electrical Employer's Agent " 2000 Edition.

Pipes and fitting shall be externally coated with fusion bonded medium density polyethylene (Sintakote2) (or other as specified by the Employer) and internally with Solvent Free Epoxy.

The target thickness of the lining material shall be 600 microns, and not less than 500 micron and test certificates of the lining thickness must be furnished to the Employer's Agent for his approval."

PSL 3.9.2.3 Repairs to epoxy coatings

ADD THE FOLLOWING TO THE EXISTING CLAUSE:

PSL 3.9.2.3.1 General

- (a) Where the damage is extensive the remedial procedures shall be agreed in writing with the Employer's Agent .
- (b) All repairs shall comply with the requirements of the repair-product manufacturer's data sheet. The Employer's Agent may at his discretion request that repaired coating areas undergo adhesion tests.
- (c) The Contractor shall repair any damage occurring during transport, on site during handling, assembly, storage, and erection.
- (d) The repaired area shall be tested in accordance with Sub-Clauses 8.4 and 8.12 of SANS 1217 for compliance with the relevant requirements for thickness and electrical insulation defects respectively.
- (e) Any item showing electrical insulation defects exceeding an average of five per square metre (a cluster of pinholes within a radius of 25 mm being regarded as a single defective area), or flaking or other signs of loss of adhesion, shall not be repaired. The item shall be blast cleaned and re-coated in accordance with the relevant requirements of the Clause PSL 3.9.2.3.3.

PSL 3.9.2.3.2 Repair Methods for Minor Defects

The repair of areas showing electrical insulation defects or low film thickness shall, if approved by the Employer's Agent , be carried out as follows:

- (a) Degrease in accordance with Clause PSL 3.9.2.3.4.
- (b) Thoroughly abrade the damaged area, including an adjacent surrounding area of at least 25 mm wide, with a medium grade 220 abrasive paper;

Employer:		Contractor:	
Witness:		Witness:	



- (c) Vacuum-clean the surface to remove dust and debris in accordance with SANS 5769.
- (d) Wipe the abraded paint surface with methyl ethyl ketone and allow to dry, and
- (e) Apply as many coats of the following repair material as necessary to achieve the specified thickness and finish.
 - (i) Solvent free epoxy; or
 - (ii) Fusion-bonded epoxy powder repair kit.

NOTE: Apply a final topcoat over the repaired area to achieve a pleasing, uniform finish of the item.

PSL 3.9.2.3.3 Repair Methods for Major Defects

The total un-coated areas for renovation by the applicator shall not exceed 0.5% of the total surface area of a component. Each un-coated area for renovation shall not exceed 2 500 mm². If damaged areas are larger, the items containing such areas shall be re-coated.

The repair of areas showing damage down to the steel surface shall, if approved by the Employer's Agent, be carried out as follows:

- (a) Degrease in accordance with Clause PSL 3.9.2.3.4
- (b) Blast-clean all damaged areas to Sa 3 (ISO 8501-1).
- (c) Feather the surrounding paint for a distance of 25 mm beyond the damaged areas with a medium grade 220 abrasive paper.
- (d) Vacuum-clean the surface to remove dust and debris in accordance with SANS 5769.
- (e) Wipe only the abraded paint surface with methyl ethyl ketone and allow drying.
- (f) Apply as many coats of the following repair material as necessary to achieve the specified thickness and finish.
 - (i) Solvent free epoxy or
 - (ii) Fusion-bonded epoxy powder repair kit.

NOTE: Apply a final topcoat over the repaired area to achieve a pleasing, uniform finish of the item.

PSL 3.9.2.3.4 Degreasing

- (a) All surfaces to be coated shall be tested for oil and grease contamination by the water break free test.
- (b) Oil and grease contamination shall be removed by:
 - Steam-cleaning;
 - An emulsifiable or aqueous detergent applied in accordance with SANS 1344, and;
 - An alkaline cleaning solution.

Employer:		Contractor:	
Witness:		Witness:	



- (b) Allow to react, and then rinse off with clean, potable water to remove all residues prior to surface preparation, all in accordance with Clauses 3.3 and 3.4 of SANS 10064.
- (c) The surfaces shall be tested after degreasing and show no oil, grease and chemical contamination after degreasing.
- (d) Care shall be taken to avoid entrapment of cleaning agents in recesses or other retention areas.

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 3.9.2.4 REPAIR OF DAMAGED SINTAKOTE

PSL 3.9.2.4.1 General

Damaged Sintakote shall be repaired in accordance with the procedures detailed in the Tyco Handling and Installation Manual for steel pipeline systems for the repair of Sintakote or in accordance with clause 3.2 or clause 3.3

PSL 3.9.2.4.2 REPAIR OF SMALL PINHOLE TYPE DEFECTS

PSL 3.9.2.4.2.1 Surface Preparation

- Clean and dry the area to be repaired including the removal of dirt, dust and other contaminants. Slightly roughen the area around the repair for a minimum distance of 50 millimetres using a coarse file or abrasive paper.
- Wipe the surface with a clean dry rag.

PSL 3.9.2.4.2.2 Priming

- Stir the primer to ensure complete mixing prior to application. Apply a thin even coat of Densopol Primer D around the area of repair using a paint brush or roller
- Allow the primer to tack dry (approximately 10 to 20 minutes)

PSL 3.9.2.4.2.3 Tape Wrapping

- Apply Deponsole 60 tape to the repair area ensuring a minimum of 50 mm overlap onto sound coating around the defect area.
- Apply Denso MP/HD P.V.C self-adhesive over wrap tape around the full pipe circumference to completely cover the repaired patch.

PSL 3.9.2.4.3 REPAIR OF LARGE AREA OF DAMAGE WHERE STEEL IS EXPOSED

PSL 3.9.2.4.3.1 Surface preparation

Cut out the area of Sinkakote and clean the steel surface in accordance with AS1627.2. Clean and dry the area to be repaired. Slightly roughen the area around the repaired using a coarse file or abrasive paper. Wipe the surface clean with a dry clean rag.

PSL 3.9.2.4.3.2 Priming

Employer:		Contractor:	
Witness:		Witness:	



- Stir the primer to ensure complete mixing prior to application. Apply a thin, even coat of Densopol Primer D onto the steel surface and around the periphery of the Sintakote.
- Allow the primer to track dry (Approximately 10 to 20 minutes)

PSL 3.9.2.4.3 Filling/Priming

- Cut out a piece of Bitumen Mastic Strip to fit into the bare steel area prior to applying the primer.
- Insert the cut out piece of Bitumen Mastic Strip into the repair area.
- Re-apply a thin even coat of Densopol Primer D over the patch and adjacent area of Sintakote.
- Allow the primer to track dry (Approximately 10 to 20 minutes)

PSL 3.9.2.4.4 Tape Wrapping

- Apply Densopol 60 tape to the repair area ensuring a 50mm overlap over the fitted patch.
- Apply Denso MP/HD P.V.C self-adhesive over wrap tape around the full pipe circumference to completely cover the repaired patch.

PSL 3.9.2.4.4 SURFACE PREPARATION

All joints shall be fully welded and sealed and all sharp edges and corners ground off to a radius of not less than 1.5 mm. All weld spatter and irregularities shall be removed. Any unsound or damaged edges of sintakote shall be cut back into the sound coating and the edges chamfered.

The surface shall be cleaned by means of power tools to achieve a minimum surface preparation in accordance with AS1627.2 TO CLASS St. 2. All dust, dirt, moisture and grease shall be removed. Slightly roughen the sintakote 100 millimeters both sides of the joint, using a coarse file or abrasive paper. Wipe the surface clean with a dry rag.

PSL 3.9.2.4.5 PRIMING

- Stir the primer to ensure complete mixing prior to application, Apply a thin even coat of Densopol Primer D to the steel and roughened sintakote surfaces using a paintbrush or roller.
- Allow the primer to touch dry (approximately 10 to 20 minutes)

PSL 3.9.2.4.6 MASTIC FILLING

To improve the contours for wrapping the tape, fillet welds, sharp edges of sintakote, test plugs or welding lid holes shall be filled and profiled with Bitumen Mastic Strip. The mastic filling shall be moulded such that the Densopol 60 tape can be applied with no sharp edges protruding or air entrapment.

PSL 3.9.2.4.7 TAPE WRAPPING

Employer:		Contractor:	
Witness:		Witness:	



Commencing at least 100 millilitres back onto the primed sintakote one complete turn of 150 millilitre wide Densopol 60 tapes shall be applied. Release film shall be removed before application. While holding the tape under tension, the pipe shall be spirally wrapped using a 55 percent overlap and finished 100 mm onto the primed sintakote with one complete circumferential wrap around the pipe. The tape shall be cut off in the downward direction of wrapping. New roles of tape shall have the ends overlapped at least 75 mm.

During wrapping the tape shall be smoothed out by hand to exclude any air bubbles or wrinkles and to seal overlaps.

Care shall be taken to prevent any folds or misplacement of the tape, especially under the pipe, and to prevent the tape becoming contaminated during wrapping.

The butt-welds in segmental (lobster bends) are to have the tape applied partial layer by partial layer with a 55 percent overlap until a full spiral wrap can be made (refer sketch in appendix A) continue wrapping onto the primed sintakote for at least 100mm with one complete circumferential wrap around the pipe.

Straight steel pipes shall also be wrapped with Densopol 60 with a 55 percent overlap in accordance with the above clauses.

PSL 3.9.2.4.8 STEEL FITTINGS AND FLANGES

PSL 3.9.2.4.8.1 GENERAL

Procedures for the protection of steel fittings apply to both main pipeline fittings and branch pipe work. Fittings manufactured shall be factory coated with Sintakote. Difficult fittings such as valves may be protected using a more conformable petrolatum system in accordance with TS29 only with the approval of the Employer.

PSL 3.9.2.4.8.2 SURFACE PREPARATION

Still surfaces shall be prepared in accordance with clause 4.1.

PSL 3.9.2.4.8.3 TAPE WRAPPING

Prepare and wrap all straight sections leading up to the fitting and flange in accordance with section 4.

PSL 3.9.2.4.8.4 PRIMING

- Stir the primer to ensure complete mixing prior to application. Apply a thin even coat of Densopol Primer D to the prepared steel surfaces and a minimum of 50mm onto the Densopol 60 wrapped areas using a paint brush.
- Allow the primer to touch dry (approximately 10 to 20 minutes).

PSL 3.9.2.4.8.5 MASTIC WRAPPING

Unavoidable sharp edges such as bolts, nuts and collars shall have mastic strip moulded over the positions or edges. Strip with a 55 percent overlap onto itself and minimum 50mm overlap onto the Densopol 60 or Sintakote coated pipe work. Press

Employer:		Contractor:	
Witness:		Witness:	



the Bitumen Mastic Strip firmly into place ensuring no air voids are beneath the Bitumen Mastic Strip.

Note: The Bitumen Mastic Strip provides corrosion protection to the steel work and is similar in composition to Densopol 60, but it does not have a woven carrier.

PSL 3.9.2.8.6 OVER WRAPPING

150 or 100mm wide Denso MP/HD tape (self-adhesive PVC) shall be spirally wrapped over the Bitumen Mastic Strip with a 55percent overlap. While wrapping, the Denso MP/HD tape shall be pulled firmly and the lapse properly sealed.

PSL 3.9.2.8.7 TESTING

All repairs and wrapping shall be tested using a high voltage “spark” tester in accordance with AS3894.1 at an operating voltage of 15 KV.

Employer:		Contractor:	
Witness:		Witness:	



PSL 3.9.3 Protection against electrolytic corrosion

OMIT THE EXISTING CLAUSE AND INSERT THE FOLLOWING:

"All joints and fittings shall be fully wrapped with approved protective tapes. Protective tape shall comply with either Specification A or Specification B as ordered by the Employer's Agent .

Specification A

This tape shall be made up of pre-bonded components to form a composite single wrap tape. The adhesive inner protective tape must provide complete protection to steel piping against electrolytic corrosion. It shall be impermeable to water, chemically inert and physically stable and must provide a perfect seal at the overlap on a spiral-winding pattern.

The adhesive outer protective tapes shall be tough and impact resistant, providing suitable protection of the inner protective tape against mechanical damage. It shall be stable and not crack or deteriorate when buried. The tapes shall be chemically resistant to all common acids and alkalis normally encountered in the soils at the construction site.

The tapes shall be suitable for both machine and hand application.

The Combination electrical characteristics of the inner and outer wrap together must exceed:

Dielectric strength = 25kV/mm
Insulation = 10 Ohm metre

The following minimum criteria shall be satisfied:

	Inner Tape	Outer Wrap
Thickness (mm)	0,3	0,3
Tensile strength (kg/cm width)	3,3	5,0
Elongation at break (%)	200%	50%
Adhesion to primed steel (gm/cm width)	220	220

Specification B

This tape shall be made up of a non-woven synthetic fibre carrier impregnated and coated on both sides with a compound incorporating high melting point bitumen (Densotherm or similar approval). During application the tape shall be correctly heated and laps adequately sealed all in accordance with the instructions and recommendations of the supplier.

Before the application of any protective material, the surface of the pipe shall be thoroughly cleaned and all loose or damaged pipe coating removed. All ridges, depressions and steps in the surface shall be filled with an approved filler so as to present a smooth uniform surface. After the filler has hardened, the entire surface to be wrapped shall be primed with a primer or otherwise treated as recommended by the supplier of the tape.

Employer:		Contractor:	
Witness:		Witness:	



The protective tape shall be applied as a spiral wrap with not less than 50% overlap. The width of the tape shall be appropriate for the section to be wrapped."

PSL 3.9.5 Joints, nuts, bolts and washers

DELETE AND REPLACE WITH THE FOLLOWING:

"All bolts and nuts shall comply with the requirements of the relevant sections of SANS 1700 and shall be of Grade 4.6 steel. Washers shall be provided at each nut and shall be of the same material (or coating where applicable to match the bolt and nut. Nuts and bolts subject to vibration shall be machined finished fitted with plain washers and treated with "Loctite" or equivalent.

Bolts other than jacking bolts shall project not less than 3mm and not more than 10mm from the heads of the nuts after tightening.

All bolts to be built into concrete work as well as bolts to be installed above ground level (outside buildings), directly above and under water shall all be of stainless steel grade 304. Bolts for flexible couplings and flanges for underground installation shall be hot dip galvanized. Bolts to be installed inside buildings shall be hot dip galvanized. Galvanizing shall be in accordance with the Standard Corrosion Protection Specification (Heavy coating).

Suitable plastic sleeves and/or washers shall be used for protection against corrosion by bi-metallic action".

PSL 3.9.6 Corrosive soil

ADD THE FOLLOWING TO THE EXISTING CLAUSE:

"Steel pipes, pipe fittings and steel flanges in contact with soil shall over and above the protection as described above be protected as specified in Clause 3.9.3 with "DENSO" tape and/or mastic or approved similar. Application shall be strictly in accordance with the manufacturer's instructions. A polyethylene tape of 300 microns minimum shall be spirally wrapped over the petrolatum tape and fixed to the clean pipe ends with pressure sensitive tape."

PSL 5 CONSTRUCTION

PSL 5.1 LAYING

PSL 5.1.4 Depth and Cover

PSL 5.1.4.2 Cover

ADD THE FOLLOWING TO THIS SUBCLAUSE:

"The minimum cover to finished surface over water mains shall be at least 1000 mm in trafficked areas and at least 800 mm elsewhere. At valves the depth of the pipeline shall be increased if necessary to ensure a minimum cover of 100mm over the valve cap. The cover shall be maintained as close as possible to the minimum without local sags or humps and shall not be increased above the minimum by more than 200mm without the approval of the Employer's Agent ."

Employer:		Contractor:	
Witness:		Witness:	



PSL 5.2 JOINTING METHODS

PSL 5.2.3 Welding

DELETE THE EXISTING CLAUSE AND REPLACE WITH THE FOLLOWING:

a) General

“Field welding of pipes which have been lined will be permitted only for pipes of DN600 and larger where a man is able to enter the pipe to make good the lining after welding and testing in accordance with Clause 7.2 of SANS 1200L has been completed. Pipes of lesser diameter may be field welded where concrete linings will be made after the pipeline has been laid and all welds have been tested and approved.

At the discretion of the Employer’s Agent , roll welding will be permitted, provided pipe alignment is maintained by use of skids or of structural framework to accommodate two or more lengths of pipe with an adequate number of roller dollies to prevent sag in the pipe. The entire root bead, however, shall be made with the pipe in a stationary position.

All pipes welded in the trench shall be properly laid and aligned before welding commences. Bell holes shall be excavated at all field welds. The Contractor shall not lift the pipe to provide adequate access for the welders to enable them to stovepipe weld the joint.

The alignment of abutting ends shall be such that the offset will not exceed 1.7 mm. Line up clamps shall be used for joint “fit-ups”. The use of “bridges and wedges” or any method that may induce unnecessary stresses is forbidden.

Both ends of coated and lined pipes shall be wrapped for a distance of at least 800 mm on either side of the weld by means of an asbestos mat or other approved material to ensure that weld spatter or other damage is not caused to the coating and lining during the welding process. The pipe trench shall be kept free of all dirt and water in the vicinity of the weld until after all corrosion protection measures have been completed and approved. “

b) Welding procedure and qualification of welders

Welding shall be done by only qualified welders who satisfy the requirements of API 1104, Clause 3.0. Before any welding of pipeline materials commences, the qualification of welders shall have been approved, all detailed welding procedure specifications with weld diagrams required for their completion shall have been submitted for approval in a neat form and the welding procedure qualification tests shall have been successfully concluded all in accordance with the relevant standard specifications. Each welder shall mark the pipe adjacent to the weld with the figure assigned to him.

Sufficient records shall be kept by the Contractor to ensure that all field welds can be subsequently identified with the welder concerned.

As far as practicable all out of trench welding shall preferably be done by an automatic submerged process and the Contractor shall provide all necessary plant to carry out this process. MSEAP welding may be used where in-trench welding is done.

Employer:		Contractor:	
Witness:		Witness:	



Heat treatment for welding shall be in accordance with API 1104 if required by same and the Contractor shall provide an approved shield to protect the pipe joint from wind and weather during heat treatment and welding.

c) Line up

Pipes shall be lined up in such a manner as to prevent damage thereto. If the pipe to be used has a longitudinal seam, these seams shall be staggered by not less than twenty degrees and welded sections, or single lengths, shall be assembled in such a manner that this seam shall remain in the top quadrant of the pipe during coating operations and after lowering into the trench.

d) Cleaning of pipe ends Before welding, all foreign matter shall be removed from the bevelled ends. If any of the ends of the pipe joints are damaged to the extent that satisfactory welding contact cannot be obtained, the damaged pipe ends shall be cut and bevelled with an approved bevelling machine. These field bevels of pipe ends shall be made to the satisfaction of the Employer's Agent . Should laminations, split ends, or other defects in the pipe be discovered, the joints of pipes containing such defects shall be cropped, repaired, or removed from the line as designated by the Employer's Agent .

e) Inclement Weather

No welding shall be carried out during rain or high wind unless the welder and joint are adequately protected and sheltered, to ensure that the welding is not impaired.

f) Protection of coatings and linings

Before welding commences, a suitable apron at least 800 mm wide shall be wrapped around both sides of the area to be welded to ensure that weld spatter does not damage the coating and lining.

g) Butt-welding

Pipes and specials to be joined by field welding shall be supplied with ends bevelled for welding. All welding of joints shall comply with API 1104 and only approved type welding rods shall be used. If backing rings are permitted, they shall be placed in position and wedged up or adjusted so that the pipe ends are completely circular and properly mated. The space between abutting pipe ends, when aligned for welding, shall be such as to ensure complete penetration without burn-through. For pipes having the same dimensions, the spacing shall be approximately 1.5 mm. The alignment of the abutting pipe ends shall be such as to minimize the offset between pipe surfaces. For pipes of the same nominal wall thickness, the offset shall not exceed 1.5 mm. Internal line-up clamps shall be used wherever practicable and may be removed after the root bead is 50% completed, provided that the completed part of the root bead is in segments of approximately equal lengths, spaced about the circumference of the pipe. If conditions make it difficult to prevent movement of the pipe, or if the weld will be unduly stressed, the root bead shall be completed before releasing clamp tension.

External line-up clamps shall be used where it is impracticable to use internal line-up clamps. Partial root beads made when using external clamps shall be uniformly spaced about the circumference of the pipe, and shall have an accumulative length of not less than 50% of the pipe circumference before the clamps are removed.

Employer:		Contractor:	
Witness:		Witness:	



Tack welding shall be carried out to maintain the root gap and position of the pipe ends during the welding proper. The number of tack-welds shall be kept to a minimum but shall not be less than four around the circumference of the pipe.

After proper preparation and tack welding, the root bead shall be carried out followed by successive filler passes, and capper pass in accordance with the approved welding procedure.

The filler and finish beads shall be deposited by an acceptable method and each filler bead shall be approximately 3 mm in thickness. Completed welds shall have a reinforcing of not less than 0.8 mm and not more than 1.5 mm above the pipe surface around the entire perimeter of the weld, and the width of the finish or cover shall be not more than 3 mm greater than the original groove. The number of beads required shall be governed by the wall thickness of the pipe, so that the completed weld will have the reinforcement previously specified; provided, however, that each weld shall consist of at least three beads. No two beads shall be started at the same point. No mitre welds will be permitted, and all welds are to be at ninety degrees ($\pm 5^\circ$) to the axis of the pipe. All slag and scale shall be removed from each bead for visual inspection immediately after each bead is run.

In all field butt-welds where it is possible to work inside the pipe, the inside weld shall be done first.

The chemical composition of weld metal and parent metal shall be similar and the inner weld metal or reinforcement shall not extend more than 1 mm above the inside metal surface of a pipe or special, and any excess shall be removed by grinding.

Defects caused by stray welding arc flashes shall be removed by grinding, provided that the pipe wall thickness is not reduced to less than the specified minimum thickness, otherwise the portion shall be cut out and repaired.

h) Fillet welding

Welding shall be as for butt-welding as applicable. All pipes of 600 mm ND and over shall be welded on both the outside and the inside.

i) Repair of welds

Rectification of defective welds shall be in accordance with API 1104 and to the satisfaction of the Employer's Agent. All costs related to the repair of defective welds shall be borne by the Contractor. Defective welds shall be repaired immediately they are found to be so. The Employer's Agent has the right to stop the Contractor proceeding with further pipe laying in the event of the Contractor delaying the rectification of defective welds. Furthermore, no consideration will be given to any claims arising from delays in construction resulting from such action.

All welded joints which have been repaired shall be 100% radiographed or otherwise tested to the Employer's Agent's satisfaction at the Contractor's own expense.

PSL 5.8 BRICKWORK IN CHAMBERS AND MANHOLES

ADD THE FOLLOWING TO THIS SUBCLAUSE:

Employer:		Contractor:	
Witness:		Witness:	



"The joints of exposed faces shall be flush-trowelled, hard and smooth and shall be rubbed for the full width of the joint as the work proceeds to give a hard polished finish."

ADD THE FOLLOWING NEW SUBCLAUSE

PSL 5.11 WORK ON EXISTING MAINS

Where connections are to be made to existing mains, the Contractor shall excavate back along the existing main only as far as is necessary to complete the connection satisfactorily and shall ensure that the existing mains are disturbed as little as possible. Backfilling shall be carefully placed and properly compacted beneath existing and new work to ensure that the mains, specials, etc. are properly bedded.

Work on existing mains and components of the reticulation system shall be carefully planned in consultation with the Employer's Agent . The work shall be carried out expeditiously to ensure that the disruption of services and inconvenience to the local residents is kept to a minimum. All tie-ins shall be completed within a maximum of 10 hours.

The Contractor under strict supervision by the Employer's Agent or The Employer will do all these connections.

Hand excavation must be used to expose the existing mains and erf connections where required. While every effort has been made to ensure that the information relating to these connections is correct the Employer's Agent or The Employer takes no responsibility for the accuracy, or for the completeness of the information."

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 5.12 CONNECTION TO THE EXISTING MAINS

The Contractor shall supply all necessary fittings / materials for under pressure connections suitable for all pipe sizes.

The Contractor shall confirm all measurement on site prior to ordering any pipe fittings."

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 5.13 PIPELINE RENEWAL WORK

All material recovered as a result of the repairs or replacement of the components shall be returned to the Contractors store where they shall be cleaned, sorted and listed. A list of the recovered material shall be handed to the Employer's Agent on a monthly basis. All recovered material shall be delivered to the Zandfontein Depot on a regular basis or at the end of the Contract.

ADD THE FOLLOWING NEW CLAUSE:

Employer:		Contractor:	
Witness:		Witness:	



PSL 5.14 STERILISING OF WATER MAINS

All new water mains shall be sterilised at 10mg/l free chlorine for 12 hours and will then be thoroughly flushed.

PSL 7 TESTING

PSL 7.2 INITIAL TESTS ON WELDED STEEL PIPES

PSL 7.2.2 Radiographic Examination

Fifteen percent of all welded joints, or when ordered by the Employer's Agent, shall be examined radiographically.

ADD THE FOLLOWING NEW CLAUSE:

PSL 7.2.3 Hydrostatic Test

- (a) All pipes and fittings shall be subject to an approved hydrostatic test and to a test pressure determined as follows:

$$P = \frac{2000 t f}{D}$$

Where

P = test pressure in kPa

F = 85 percent of the guaranteed minimum yield strength in MPa for steel plate

D = outside diameter of the pipe in mm

T = wall thickness in mm.

- (b) Hydrostatic testing shall not be carried out until all aspects of fabrication have been completed.
- (c) The pressure shall be applied steadily by approved means and maintained without variation sufficiently long for proof and inspection.
- (d) Should water sweat or ooze from any part or any defects of any nature be discovered the pipe shall be emptied and the defects made good. The pipe shall then be tested again. Should a pipe, after repair, fail to pass the second hydraulic test the Employer's Agent may order its rejection.
- (e) The fact that any pipe may have passed the hydraulic test at the works shall not exempt the Contractor from his liability under Clause 7 of the General Conditions of Contract 2015.
- (f) If a pipe fails to pass any of the above tests in Clauses PSL 7.2.1, PSL 7.2.2 or PSL 7.2.3, it shall be rejected, but the Employer's Agent may permit repairs or alterations to be made to enable the pipe to pass the test.

Employer:		Contractor:	
Witness:		Witness:	



- (g) The Employer's Agent may require one or more pipes to be tested to destruction. If practicable the Employer's Agent may require the Contractor to repair the pipes and retest them. The cost of repairs will be paid by the Employer as an extra to the Contract."

PSL 8 MEASUREMENT AND PAYMENT

PSL 8.2 SCHEDULED ITEMS

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 8.2.16 Demolish Structure

The unit of measurement shall be sum for various types of structure.

The rate shall cover the cost of excavation, plant and labour required, demolishing the existing chambers, safeguarding the existing valves and specials from damage and safely disposing of the rubble material. It shall also cover the re-instatement of the structure, if applicable, to a state similar or better to pre-construction conditions. Structures to be demolished and re-instated will be identified and / or confirmed during the site visit.

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 8.2.17 Connect to Existing Mains

- a) Description of connection, types and diameters involved.....Unit: No

- b) Etc for the other items

The rate shall cover the cost of isolating, cutting, excavation (up to 2 m deep), bedding, dewatering and exposing the existing main at the connection point, supply necessary fittings for under pressure connections for the section of the mains as required, temporary support, safety precaution backfilling and the removal of surplus and unsuitable material. The supply and installation of fittings and couplings shall be measured separately. Includes arrangements for shut-down.

ADD THE FOLLOWING NEW SUBCLAUSE:

PSL 8.2.18 Recover valves, fittings, specials, etc.

- a) Description of item.....Unit: No.

- b) Etc for other item

The unit of measurement shall be number of described item to be recovered

The rate for the recovery of the above shall cover the cost of the excavation, breaking out existing brick or precast concrete, and removal of the valves, fittings and specials removal of debris and spoil to Contractor's dump site and importing suitable backfill material, the plugging with concrete of the open ends of the abandoned water mains, the removal of the surface boxes, backfilling to required density, the handling and

Employer:		Contractor:	
Witness:		Witness:	



transporting of the recovered materials to the Hamberg Depot, the listing of the salvaged materials and the backfilling and compaction of the chambers and reinstatement of surface covering.

PSL 8.2.19 Supply and install
Valves Unit: No

a) Gate Valves

All gate valves shall be flanged wedge type isolation valves to SABS 664, Class as specified, anti-clockwise closing. All valves 400 mm and bigger are to be supplied with an approved **open gear box assembly** as follows:

1. For the 600mm Valve:

Multi-Stage Spur gearing with 6:1 minimum ratio, having operating spindles on the input spindle and at a stage where the valve can be stroked without exceeding the maximum input torque of 275Nm if no differential pressure is applied to the valve.

1.1 For the 450mm Valve:

Single-Stage spur gearing with 4:1 ratio having one spindle to operate with a 1:1 ratio and a second spindle to operate with a 4:1 ratio. A maximum input torque of 240Nm is recommended.

2. The gears shall be robust and machine cut and their mounting shall be of substantial design.

3. Each pinion gear spindle shall be supported between two bearings or alternatively one bearing of sufficient depth to prevent misalignment of the pinion gear and spindle. The bearings shall be fitted with bronze bushes and shall be provided with grease nipple lubricating points and shall be lubricated prior to delivery. All points to be lubricated shall be fitted with 1/8 inch BSP straight nipples for grease-gun lubrication. Adequate lubrication shall be provided for all gear and indicator bushes.

4. All valves shall open by anti-clockwise rotation of the main spindle and gearboxes shall be fitted with an intermediate idler where necessary.

5. In the case of Type A and Type B gearing a shear pin or other safety device shall be incorporated between the high and low gears to prevent damage to the valve if excessive force is applied. Two spare pins shall be attached to each valve.

6. Shear pins shall be easily replaced in the field. Hard-driven pins will not be accepted as shear pins.

b) Air Valves

Air valves must be double acting air valves of compact single chamber design with both small and large air release orifices inside the chamber. The valve must also act as a vacuum breaker, with intake capacities of 60 % of discharge rates given.

Employer:		Contractor:	
Witness:		Witness:	



The unit measurement for valves shall be number of each described assembly

The rate shall include supply installation and testing including for all corrosion protection, bolts, gaskets, and any other contingency work.

PSL 8.2.20 Cathodic Protection..... Unit: Sum

The rate shall include investigation, design, supply and commission system as per specified and/ or instructed by the Employer's Agent (Provisional Sum)

PSL 8.2.21 Supply and install fittings assembly Unit: No

The unit of measurement shall be number of a described item to be installed. The applicable particular specification contained herein on various clauses will apply to the various pieces, for example **PSL 8.2.19** will be applicable to any valve and air valve in the assembly.

The rate shall include supply installation and testing including for all corrosion protection, bolts, gaskets, and any other contingency work to enable the proper operation of the fittings assembly.

Employer:		Contractor:	
Witness:		Witness:	



PSLB BEDDING (PIPES)

PSLB 3 MATERIALS

PSLB 3.1 SELECTED GRANULAR MATERIAL

REPLACE THE CONTENTS OF THIS SUBCLAUSE WITH THE FOLLOWING:

“Selected granular material shall have a PI not exceeding 10 and shall be free from sharp-ended particles or particles exceeding 19 mm in size.”

“Selected fill material shall have a PI not exceeding 15 and shall be free from sharp-ended particles or particles exceeding 19 mm in size.”

PSLB 3.3 BEDDING

ADD THE FOLLOWING:

“uPVC and HDPE pipes are deemed to be flexible pipes for the purposes of this subclause.”

PSLB 3.4 SELECTION

PSLB 3.4.1 Suitable material available from trench excavation

REPLACE THE WORDS “(but is not required)” IN THE FIFTH LINE WITH THE WORDS “(at his own cost)”.

PSLB 7 TESTING

PSLB 7.1 DENSITY

REPLACE THE SECOND SENTENCE IN THE FIRST PARAGRAPH WITH “The test will be carried out using the Troxler method.”

ADD THE FOLLOWING SUB-CLAUSE

PSLB 7.1.1 Submission of bedding compaction test results

The Contractor will be required to submit to the Employer’s Agent four (4) compaction test results of bedding for every 100metres. Bedding compaction to be 90% MOD AASTHO density. The compaction tests to be performed by the Troxler method.

PSLB 8 MEASUREMENT AND PAYMENT

PSLB 8.1 PRINCIPLES

ADD THE FOLLOWING TO THIS SUB-CLAUSE

PSLB 8.1.3 Volume of bedding materials

Employer:		Contractor:	
Witness:		Witness:	



The volume of bedding material shall be measured net i.e. the volume of the pipe is to be deducted.

PSLB 8.1.5 Disposal of displaced material

DELETE THIS SUB-CLAUSE AND REFER TO CLAUSE PSDB 5.6.3:

PSLB 8.1.6 Free-haul

DELETE THE WORDS "of 0,5 km" IN THE FIRST LINE OF THIS SUBCLAUSE.

PSLB 8.2 SCHEDULED ITEMS

PSLB 8.2.1 Provision of bedding from trench excavations

DELETE THIS SUB-CLAUSE AND REPLACE WITH THE FOLLOWING:

Without the need for screening or other treatments:

a)	Selected	granular
material	Unit: m3	
b)	Selected	fill
material	Unit: m3	

The rates shall cover the cost of acquiring, from any point along the trench excavation as be Selected by the Employer's Agent within 5,0 km, bedding that complies with the relevant requirements of the specification, of delivering it to points alongside the trench spaced to suit the Contractor's methods of working, and of disposing of displaced material within a free haul distance 5,0 km.

Including for screening and/or other treatment:

a)	Selected	granular
material	Unit: m3	
b)	Selected	fill
material	Unit: m3	

The rates shall cover the cost of screening by means of mesh sieves or otherwise treating excavated material, at any point along the trench excavation as may be selected by the Employer's Agent, in order to produce bedding that complies with the relevant specification, delivering it to points along the trench, within 5,0 km, spaced to suit the Contractor's methods of working, of making good any backfill deficiency there may be from points where screened backfill material has been acquired, and of disposing of displaced material within a free haul distance of 5,0 km.

PSLB 8.2.2 Supply only of bedding by importation

PSLB 8.2.2.3 From commercial sources (Provisional)

Employer:		Contractor:	
Witness:		Witness:	



ADD THE FOLLOWING SUB-SUBITEM TO THIS CLAUSE:

“(c) Special bedding material

- 1) Description of material..... Unit: m²
or m²
- 2) Etc for other items

The unit of measurement shall be the square metre or cubic metre of material as specified.

The rate shall cover the cost as specified for (a) and (b).” The rate shall include the cost of acquiring from commercial sources, transporting regardless of distance, offloading and placing in the trench bottom clean where ordered by the Employer’s Agent .

ADD THE FOLLOWING SUB-SUBCLAUSE:

PSLB 8.2.6 Compaction Test

Compaction testing using the troxler
method..... Unit: No

Employer:		Contractor:	
Witness:		Witness:	



PSLC **CABLE DUCTS**

PSLC 3 **MATERIALS**

PSLC 3.1 **DUCTS**

ADD THE FOLLOWING:

PSLC 3.1.1 **Split uPVC pipes**

Split pipes shall only be used to provide ducts for existing services that cannot be severed and threaded through the ducts. The pipes shall be cut accurately in the middle, and opposite halves shall be matched as sawn. Split pipes shall be placed around the service, firmly bound by steel straps, and encased in concrete."

PSLC 3.4 **CABLE DUCT MARKERS**

ADD THE FOLLOWING:

"A cable duct marker shall consist of a 300 mm x 300 mm x 100 mm deep, class 20 MPa/19 mm concrete block, connected by means of a non-ferrous metal strip to a temporary plug to seal the end of the duct. The plug shall prevent moisture or soil from entering the duct. The metal strip shall be firmly connected to both the plug and the concrete block. The concrete block shall be positioned not further than 0,5 m horizontally from the end of the cable duct. The face of the concrete block shall be clearly marked "E" to indicate electricity cables."

PSLC 8 **MEASUREMENT AND PAYMENT**

PSLC 8.2 **SCHEDULED ITEMS**

PSLC 8.2.5 **Supply, lay, bed and prove duct**

REPLACE THE PAYMENT PARAGRAPH WITH THE FOLLOWING:

"Separate items are scheduled for each diameter of duct.

The rates shall cover the cost of providing all the materials and the cost of laying the ducts, installing the draw wire, jointing, bedding and providing all as specified."

Employer:		Contractor:	
Witness:		Witness:	



PSLG PIPE JACKING

PSLG 8 MEASUREMENT AND PAYMENT

PSLG 8.2.1 Jacking Establishment

ADD THE FOLLOWING:

"The sum for a) and b) above shall include for the total number of jacking establishments as specified."

PSLG 8.2.11 Installation of pipe in a sleeve..... Unit : m

The steel pipe joints shall be welded on site and the completed pipe pulled through the sleeve, using appropriate guides approved by Employer's Agent . All precautions for not damaging the coatings shall be taken.

PSLG 8.2.12 Grouting of annulus between pipe and sleeve Unit : m³

After securing the steel pipe in position the annulus between the pipe and the sleeve shall be grouted. The grout shall be sand/cement (CEM 11 42.5) mix with a minimum of 375kg/m³ cement content.

Employer:		Contractor:	
Witness:		Witness:	



PSSCSUB-CONTRACTORS

PSSC 1 Value of Sub-Contracted Works

The Main Contractor shall retain liability and responsibility for the management, scheduling, and quality control of all works performed by the sub-contractors. After appointment of the Main Contractor, the Main Contractor can approach potential sub-contractors to provide rates for the items marked with SC in the Bill of Quantities. The Main Contractor will be expected to conduct a competitive process to recommend a Sub-Contractor or Sub-Contractors to Johannesburg Water. Johannesburg Water will then evaluate all rates provided by the Sub-Contractor for fairness. Johannesburg Water will then either a) approve the appointment of the Sub-Contractor or Sub-Contractors or b) enter into negotiations with the Main Contractor and sub-contractor / s or c) request that the Contractor recommend a different sub-contractor.

..... Unit: Prov Sum

PSSC 2 Overhead, charges and profit fee for the Main Contractor to oversee sub-contracted works.

The Main Contractor shall retain liability and responsibility for the management, scheduling, and quality control of all works performed by the sub-contractors. This item will be calculated as a percentage of the sum of works allocated to the sub-contractors and shall include the process to appoint a sub-contractor as described in PSSC 1, as well as all costs and charges to manage all sub-contracted works..

..... Unit: %

PSSC 3 Fixed-charge items for the sub-contractors Contractual Requirements

The final amount will be determined by the process described under PSSC 1..... Unit: Prov Sum

PSSC 4 Overhead, charges and profit for the Main Contractor to provide for fixed-charge items for the sub-contractors Contractual Requirements.

This item will be calculated as a percentage of PSSC 3 Unit: %

PSSC 5 Time Related items for the sub-contractors Contractual Requirements

The final amount will be determined by the process described under PSSC 1..... Unit: Prov Sum

PSSC 6 Overhead, charges and profit for the Main Contractor to provide for time related items for the sub-contractors Contractual Requirements

This item will be calculated as a percentage of PSSC 5 Unit: %

PSSC 7 Training for SMMEs

Employer:		Contractor:	
Witness:		Witness:	



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This item will include for accredited and certified on-the-job training for SMMEs.....Unit: %

PSSC 8 Overhead, charges and profit for the Main Contractor to provide for training for SMMEs
This item will be calculated as a percentage of PSSC 7 Unit:%

Employer:		Contractor:	
Witness:		Witness:	



PORTION C: PARTICULAR PROJECT SPECIFICATION FOR PIPES EQUAL OR LARGER THAN 400MM ND

SECTION A: EXCAVATION, BACKFILLING, ETC OF PIPE TRENCHES

ASC 1. GENERAL REQUIREMENTS

Under this Section of the contract the Contractor shall:

- (a) Set out the works, clear the working strip, construct and maintain causeway and provide pipe storage strip, pipe storage mounds and pipe laying platform alongside the trench.
- (b) Remove, store and replace topsoil.
- (c) Excavate the trench and prepare the trench floor for the pipeline in accordance with the dimensions detailed on the drawings and stated in the price schedule.
- (d) Enlarge and deepen the trench for joint holes and band holes where required, excavate for valve chambers, structures and any additional excavation as required by the Employer's Agent .
- (e) Carry out crossings of roads and other services.
- (f) Expose existing pipelines for sufficient length to allow connections between new pipe and existing pipe to be installed.
- (g) Construct the pipe bed foundation and the pipe bed.
- (h) Supply fill and backfill the trench after the pipe installation has been completed and backfill the structures after construction is completed, cart away and dispose of surplus spoil where required and generally reinstate the working strip.
- (i) Maintain the trench, trench floor and or pipe bed until the pipe and fittings are installed, maintain the trench until backfilling is instructed by the Employer's Agent , and maintain the backfilled trench for twelve months after the final completion of the works.

ASC 2. RATE OF PROGRESS

- ASC 2.1 The Contractor shall maintain a rate of progress of the excavation work, preparation of the trench floor, the pipe bed, backfilling and reinstatement not less than the stipulated in the programme set out in the Special Conditions of Contract. In this connection, continuous stretches of trench shall be excavated and rock shall be removed as encountered.
- ASC 2.2 No payment shall be made for discontinuous stretches of trench except where reasonable lengths of trench in hard material have been completed ahead of the work.
- ASC 2.3 The length of open trenches ahead of the pipe laying shall not exceed 150m, unless otherwise directed by the Employer's Agent .
- ASC 2.4 Where the route of the pipeline is in soil of low shear strength and/or waterlogged, the Contractor shall excavate the trench, prepare the trench floor, construct the pipe bed and complete the backfilling to fit in with the pipe laying so that the trench shall be open for as short a time as possible.

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Witness:		Witness:	



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- ASC 2.5 The Employer shall not be liable for any additional costs incurred by the Contractor while the work proceeds at a rate slower than the average rate as set out in the construction programme.
- ASC 2.6 Joint holes, valve chambers and thrust blocks shall be excavated to suit the construction programme.
- ASC 2.7 At all stages of the excavation including portions in rock the Contractor shall obtain the position of joint holes, valve chambers and thrust blocks timeously so that no delay to pipelaying and chamber construction occurs from the blasting, breaking, trimming and clearing operations for these items.
- ASC 2.8 The installation of pipes will commence as soon as the excavation and preparation of the trench floor, pipe bed and excavation of joint and band holes has proceeded far enough.
- ASC 3. ACCESS TO WORKING AREA**
- ASC 3.1 Prior to carrying out the excavation the Contractor shall clear the working strip to accommodate the trench, banks of spoil, a pipe laying platform, an access road and a pipe storage strip, of all trees, bush, rubbish, boulders, rock outcrops and other objectionable material.
- ASC 3.2 The bulk excavation shall be undertaken in such a way that reasonable access to the trench side for the delivery of pipes and pipe laying operations is provided within the working strip along the entire length of the trench.
- ASC 3.3 The Contractor shall be responsible for providing the pipe laying platform, the access road and the pipe storage stop. Soft and wet areas shall be stabilised by the addition of suitable compacted material from the excavations and the Contractor shall maintain the working strip in a reasonable condition during the period when pipes are being delivered and during the installation of the pipes and construction of the structures.
- ASC 3.4 In addition, the Contractor shall prepare and maintain access tracks from public or private roads to the working area for use by the pipe delivery vehicles and pipe laying equipment. A track shall be formed only on the express instruction of the Employer's Agent and shall be constructed by clearing vegetation, boulders and rock outcrops etc from the width of the track and where instructed by the Employer's Agent, the Contractor shall obtain, transport, dump, level and compact suitable selected material from the excavations to form the track.
- ASC 3.5 The Contractor shall take the necessary measures to control dust resulting from his activities on public roads and on the working area. Loaded trucks shall be covered by tarpaulins and all access roads and working areas shall be regularly sprayed with water.
- ASC 3.6 The Contractor shall provide and maintain suitable access to each house, garage, stand, plot, farm, business premises etc. on the pipeline route. Where necessary a temporary bridge shall be constructed across the trench to maintain access and these bridges shall be safe and suitably protected by approved guards, fencing, lights, etc.
- ASC 3.7 The Contractor shall timeously provide pipe storage mounds for the temporary storage on site of the pipes.
- ASC 4. NATURE OF MATERIAL**
- ASC 4.1 Material is defined as soft material, rock, pavement, road surfacing and foundations concrete and other substances encountered during the excavation of the trench.

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Witness:		Witness:	



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- ASC 4.2 The Contractor shall inspect and examine the site and its surroundings and shall satisfy himself before submitting his tender as to the nature of the material, and sub-soil (so far as it is practicable), and shall himself obtain all necessary information as to risks, contingencies and other circumstances that may influence or affect his tender.
- ASC 4.3 It is expected that a certain portions of the trench will be in continuous and discontinuous rock, particularly in the lower portions of the trench, and can require blasting and hand labour.
- ASC 4.4 Sections of the trench will traverse unstable material such as saturated clay soils, water courses, etc., and in such circumstances the trench will be required to be excavated and the trench floor and pipe bed prepared in close conjunction with pipe laying operations. At all times the excavation shall comply with safety requirements stipulated in ASC 6.5 and ASC 20.
- ASC 4.5 The Contractor shall make provision for dealing expeditiously with the excavation of trench in hard material as encountered and shall provide separate rock blasting gangs to work ahead of the normal trenching and trimming gangs.
- ASC 4.6 The material is classified in the price schedules under two headings, i.e. soft material and rock and the following shall be determining factors in the classification of the material:
- (a) "Soft material" shall mean all material not classified below, and shall include all material that is pickable and can be excavated by machinery or appropriate capacity and power for the rate of excavation required, including hard clay, calcareous material and soft rock that has not been consolidated into a hard unpickable mass. "Soft material" shall not require the use of explosives.
- (b) "Rock" shall mean all rock that is partially jointed, or unweathered and shall include oxidised hard shale, hard fireclay, hard coal conglomerate, hard homogenous ouklip, granite, quartz, dolomite, etc or materials of similar hardness which in the opinion of the Employer's Agent can only be removed by drilling and blasting. Solid boulders in excess of 0,5 m³ in size shall be classified as rock.
- ASC 4.7 The decision of the Employer's Agent as to the classification of the material shall be final and binding and any objection to the classification shall be made before the trench is backfilled.
- ASC 5. TOPSOIL**
- ASC 5.1 Topsoil is defined for the purpose of this contract as the upper layer of soft material with a depth not exceeding 300 mm below the natural ground surface in which veld or cultivated grass is growing.
- ASC 5.2 The Contractor shall strip the topsoil over the pipe trench to the width shown on the drawings and place it in stockpiles, heaps or layers separate from the other excavated material for later replacement in the upper layer of the backfilled trench. In order to conserve the bacteriological life in the topsoil the storage heaps, strips or layers shall not exceed 1,5 m in total depth.
- ASC 5.3 The topsoil shall be returned to the upper 300 mm layer from which it was removed. The topsoil shall be evenly spread and lightly compacted to leave the upper ground surface in a neat and tidy condition as near as may be to the original condition encountered before excavation commenced, all in accordance with the details shown on the drawings.
- ASC 5.4 No topsoil shall be transported from the area from which it was excavated.

Employer:		Contractor:	
Witness:		Witness:	



ASC 6. SIZE OF TRENCHES

- ASC 6.1 Before commencing the work the Contractor shall apply for and obtain detailed longitudinal section drawings and instructions to enable the work to be set out.
- ASC 6.2 The trench shall be excavated to the minimum specified width and be generally in accordance with the relevant details shown on Drawings. This pipeline shall be deemed to have a diameter as detailed.
- ASC 6.3 The actual depths computed from the details on the longitudinal section drawings will vary to avoid existing services, etc, and relate to the contours of the ground and the levels necessary to obtain a true grade for the bottom of the trench.
- ASC 6.4 During the course of the work the Employer's Agent will prescribe the actual depth of the trench floor below the specified pipe invert level to take into account local soil conditions.
- ASC 6.5 To comply with the regulations promulgated under the Occupation Health and Safety Act, (85 of 1993) it may be necessary to either batter the trenches to the angle of repose of the in-situ material or to shore the sides of the trench. The responsibility to comply with the requirements of the above Act, however, shall be that of the Contractor. The cost for these activities shall be included in the rates for excavation.

ASC 7. JOINT, LIFTING BAND AND STIFFENER HOLES

Before the pipes are laid, joint, lifting band and stiffener holes shall, where applicable, be excavated where required to the minimum dimensions shown on the relevant drawings. This work shall be carried out as directed and shall be completed well in advance of the pipe laying.

ASC 8. ADDITIONAL EXCAVATION

- ASC 8.1 Excavation, which is of a greater width or depth than the prescribed dimensions for the trench bulk excavation, or sundry additional excavation of any nature shall be carried out by the Contractor to the Employer's Agent's instructions. Such additional excavation shall include widening and deepening the normal pipe trench for valve chambers, thrust blocks, and other structures and for excavations ordered by the Employer's Agent and not described under ASC6 and ASC7. Such additional excavations shall be carried out as and when required by the Employer's Agent. Only that portion of the excavations in excess of the prescribed dimensions for the trench shall be paid for as additional excavations.
- ASC 8.2 Additional excavation will be required to expose existing water pipelines to allow the installation of connections to the new pipeline. The Contractor shall excavate by hand if around and under the pipelines taking care to avoid damage to the pipes. Any damage caused to pipes during excavations will be made good by Johannesburg Water and any costs so incurred will be deducted from monies due to the Contractor. It is likely that the additional excavations will have to be carried out at points distant from the main excavating head or in congested areas. The Contractor shall provide at the site separate excavating machines and hand labour to deal with the additional excavation expeditiously.
- ASC 8.3 In the case of isolating valve chambers, thrust blocks, support and anchor blocks, the floor and wall surfaces of the excavation shall be neatly cut and trimmed to within 50 mm of the specified dimensions.

ASC 9. SETTING OUT AND CARE OF SURVEY PEGS

- ASC 9.1 Line and level pegs for the centre line of the pipeline only will be set out by a Surveyor (appointed by the Contractor and paid for under a separate item) every 50

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- m and at all changes of direction and grade. The Contractor shall be responsible for the transfer care and accurate referencing of all pegs and no peg shall be taken out or moved without the permission of the Employer's Agent .
- ASC 9.2 In the event of pegs being damaged or removed as a result of the Contractor's activities the pegs will be replaced by the Surveyors at a cost of R1 000 per peg and the cost thereof will be deducted from any monies due to the Contractor.
- ASC 9.3 The Contractor shall be responsible for locating servitude and property beacons and pegs along the route of the pipeline and shall be responsible for the care of these beacons or pegs. The cost of replacing damaged survey beacons or pegs will be recovered from the Contractor.
- ASC 9.4 The Contractor shall check the condition of all line and level pegs and satisfy himself that they have not been disturbed and are true in regard to position and level. If a peg has been destroyed, disturbed or damaged before the site is handed over to the Contractor, the Employer's Agent will arrange to have a new peg installed. A peg, which has been disturbed, shall not be used unless its true position and level has been re-established and the new values have been verified by the Employer's Agent .
- ASC 10. LINE AND GRADE OF TRENCH**
- ASC 10.1 The Contractor shall set out the trench accurately in accordance with the data supplied by the Employer's Agent in terms of ASC9.
- ASC 10.2 Before commencing, the setting out the Contractor shall clear and roughly grade the surface over the full width of the trench.
- ASC 10.3 The Contractor shall provide, erect, set to line and level and maintain approved substantial profiles along the length of the trench at the 50 m line and level pegs and at changes of grade and direction. Each profile shall have its chainage marked on it and shall be fitted with a horizontal cross-bar set at a predetermined height above the trench floor level and have setting marks which will define the centre-line of the trench. Where required by the Employer's Agent , the Contractor shall provide a profile with the cross-bar extending across the full width of the trench. A profile shall remain in position during all stages of the trench excavation, the trench floor and pipe bed preparation and until the backfilling is completed past the chainage of the profile.
- ASC 10.4 The Contractor shall provide sets of boning rods, templates and piano wire, for the sole use of the Employer's Agent , for checking the level, grade and width of the trench relative to the centreline. The Contractor shall also provide, set and level all the pegs required to transfer lines and levels to the trench floor to control the preparation of the trench floor and pipe bed.
- ASC 10.5 The Contractor shall maintain correct line and grade throughout the work. Precise control of the grade of the trench floor and pipe bed is required and the Contractor shall compute the trench floor and pipe bed levels at each pipe joint position indicated by the Employer's Agent and install a level peg at the position of each joint and each change of grade to enable the pipe to be installed in accordance with the levels and grades shown on the relevant longitudinal section drawings. The accuracy of the computation of and transfer of levels from the levelled pegs provided by the Employer's Agent at the trench centre line to those installed by the Contractor to establish the trench floor shall be within 3 mm of the correct level. The competent person appointed by the Contractor as Site Agent in terms of the General Conditions of Contract shall be fully experienced and competent in the use of Employer's Agent surveying equipment and techniques.

Employer:		Contractor:	
Witness:		Witness:	



ASC 11. HANDLING EXCAVATED MATERIAL

- ASC 11.1 Spoil is defined for the purpose of this Contract as excavated material from the trench and other excavations placed and stored in temporary piles to be used for filling, backfilling into the trench or loaded and transported from the site as the work proceeds.
- ASC 11.2 Insofar as space is available within the working strip, such space may be used within the limitations imposed by ASC 11 for temporary storage of spoil in the pipe laying platform, pipe mounds and stockpiles to be used for backfilling provided that no material shall be sorted in violation of any ordinance and that no watercourse or drainage channel is obstructed.
- ASC 11.3 All spoil from the trench shall be kept within defined limits and deposited alongside the trench as directed by the Employer's Agent . All spoil shall be deposited so as to cause the minimum inconvenience to traffic, and shall be kept well clear of all manholes, culverts, railway tracks, etc, and free access to fire hydrants is to be maintained at all times.
- ASC 11.4 Rubble, road materials, broken pavement, unsuitable soil, waste concrete, rock or boulders over 150 mm in greatest dimensions and other undesirable materials together with the excavated material that cannot be utilized shall not be mixed with suitable backfill material but shall be loaded and carted off site by the Contractor as the excavation proceeds. (See ASC 28).
- ASC 11.5 The toe of the spoil bank shall be trimmed well back from the edge of the trench so as to leave the minimum of 1,0 m clear between the edge of the spoil bank and the edge of the trench. The Contractor shall keep this strip clear of spoil at all times.
- ASC 11.6 The spoil bank on the side of the trench where the pipe laying plant will operate shall be levelled, trimmed and in some cases cleared down to ground level to the Employer's Agent 's instructions.
- ASC 11.7 Where the pipeline is located in or adjacent to a road a limited amount of suitable spoil excavated from the trench shall be spread to a depth of 300 mm over the working area on road surfaces and on pavements in accordance with ASC 15.4.3. The material excavated from the trench that is surplus to this requirement shall be either stored in temporary stockpile areas arranged by the Contractor as an interim measure prior to the return of the material to the trench side for backfilling purposes or removed to permanent disposal sites in accordance with ASC 28. The cost of arranging for the temporary storage of material, either at the trench side or at suitable adjacent sites within 200 m of the applicable trench section and for the transportation to and loading up and returning therefrom shall be included in the rate for bulk excavation and no separate payment will be made in respect of this activity.

ASC 12. MATERIAL FOR FILL

ASC 12.1 Selected fill (Class I) :

- ASC 12.1.1 Only approved selected fill (Class I) shall be used for the preparation of the pipe bed and for backfilling around bitumen coated steel pipes up to 300 mm above the top of the pipe, unless directed otherwise by the Employer's Agent .
- ASC 12.1.2 Selected fill (Class I) for the pipe bed and/or backfilling bitumen coated steel pipes shall comprise loose, fine soil being mainly sandy or clayey-sand material with a plasticity index not exceeding 15. The fill shall contain no hard rock material or materials chemically deleterious to the pipe and shall be free of pebbles, stones and fragments of shattered rock with maximum dimensions exceeding 10 mm.

Employer:		Contractor:	
Witness:		Witness:	



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- ASC 12.1.3 The Contractor, when excavating the trench, shall place material that is free of hard rock material on one side and shall not allow hard rock material to be thrown on or mixed with it. If such precautions are not observed the Contractor shall replace all such mixed material with selected material without cost to the Employer.
- ASC 12.1.4 Selected fill for backfilling shall be obtained from suitable material excavated from the trench and temporarily stored in the working strip. If the spoil consists of a mixture in any proportion of soil, gravel and rock then the fine material shall be mechanically screened out to provide the selected fill.
- ASC 12.2 Selected fill (Class II) :
- ASC 12.2.1 Selected fill (Class II) shall comprise mainly soil, fine material, gravel or shattered rock available from the trench excavation but shall not contain any stones, boulders or shattered rock fragments with maximum dimensions in excess of 150 mm.
- ASC 12.2.2 Selected fill (Class II) shall be provided for backfilling the trench from the level 300 mm above the pipe in the case of bitumen coated steel pipes. The top of the backfill is here defined as the underside of the 300 mm topsoil layer, or the underside of the foundation of the road, whichever is applicable, the natural ground level as determined by the Employer's Agent , or in special circumstances such as in agricultural lands or market gardens, the level prescribed by the Employer's Agent .
- ASC 12.2.3 Where special precautions have been taken to protect the bitumen wrappings of the pipe the Employer's Agent may require that selected fill (Class II) be provided for the preparation of the pipe bed and for backfilling around bitumen coated steel pipes up to 300 mm above the top of the pipe.
- ASC 12.3 General specifications for both classes of selected fill - Class I and Class II :
- ASC 12.3.1 Where in the opinion of the Employer's Agent no material suitable for use as selected fill is available from the excavations within 200 m distance of where it is required then the Contractor shall either import selected fill to the trench side or load and transport selected fill from material selected and stockpiled at another point along the pipe trench.
- ASC 12.3.2 Importation of selected fill shall be undertaken by the Contractor from approved borrow pits away from the working strip which shall be negotiated for, established, worked and finally smoothed over and tidied or reinstated by the Contractor in accordance with the property owners requirements.
- ASC 12.4 38-mm stone :
- ASC 12.4.1 38-mm Stone shall be hard non-friable quartzite, dolomite or other suitable rock, in accordance with SABS 1083 (latest edition) crushed and screened to the specified sizes, of good shape, clean and free from dust. The voids ratio of the stone shall not exceed 47 per cent and the maximum dimensions shall not be more than 38 mm.
- Samples of the stone shall be submitted to the Employer's Agent for his approval before use.
- ASC 12.5 Soil cement fill :
- ASC 12.5.1 Soil for soil cement shall be selected from the trench excavations or, if no suitable soil is available from that source, imported from a borrow area to be negotiated for by the Contractor. The material shall be a fine sandy or clayey-sand soil with a plasticity index of not more than 10 and shall comply with the following grading requirements

Employer:		Contractor:	
Witness:		Witness:	



Sieve size mm	Percentage passing		
9,5	100		
6,7	95	-	100
4,75	90	-	100
2,36	85	-	100
1,18	80	-	100
0,60	70	-	100
0,30	60	-	90
0,15	10	-	70
0,075	0	-	25

ASC 12.5.2 The soil cement fill shall be prepared by mixing selected soil with a quantity of six per cent by mass of ordinary Portland cement (CEM 1 42,5) and up to 25 per cent by mass of water. Soil cement shall be thoroughly mixed and shall contain no lumps, clods or foreign matter. The plastic consistency shall be such that it will flow freely into the trench or formwork without segregation. Cement, soil and water shall be machine mixed in a pugmill, rotary drum, or other approved continuous type mixer.

ASC 12.5.3 Prior to the placing of any soil cement fill the Contractor shall submit a detailed report from an approved soil testing laboratory stating the grading analysis, plasticity index and the 7 and 28 day test cube strengths obtained for mixes with water contents of 20, 25 and 30 per cent for each type of soil proposed for use in the soil cement fill.

ASC 12.5.4 The Employer's Agent will select the optimum water content of the soil cement fill and notify the Contractor. During the progress of the placing of the soil cement fill, tests shall be made by the Contractor under the direction of the Employer's Agent to determine whether the soil cement being produced complies with the required consistency. Soil cement fill with a consistency below that selected by the Employer's Agent will be rejected.

ASC 12.6 Crusher run fill :

ASC 12.6.1 Crusher run fill shall comprise a stable mixture of fragmented rock and fine binder material complying with the following grading requirements :

Sieve size mm	Percentage passing		
26,5	100		
19	85	-	95
13,2	71	-	84
4,75	42	-	60
2,0	27	-	45
0,425	13	-	27
0,075	5	-	12

The following indices and limits shall not be exceeded:

Maximum flakiness index: 35

Atterberg Limits : Liquid limit : 25; plasticity index : 6 and linear shrinkage : 3.

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ASC 12.6.2 The crusher run fill shall be thoroughly mixed to provide a homogeneously graded material and the quantity of water to provide the optimum moisture content for compaction to the required density shall then be added and the material again thoroughly mixed.

ASC 12.6.3 The crusher run fill shall be placed in the trench and compacted as required at the optimum moisture content. The Contractor shall take all necessary measures to prevent drying out of the material prior to the completion of compaction.

ASC 13. PREPARATION OF THE TRENCH FLOOR

ASC 13.1 Overbreak and over-excavation :

ASC 13.1.1 It is to be expected that during the bulk excavation material will be removed from below the prescribed trench floor position. In cases where the floor is formed of rock the additional depth will for purposes of this contract be termed overbreak and this can be expected to vary according to the nature of the rock, the jointing planes, the extent of weathering of the rock, the methods and procedures used in the blasting of the rock and the expertise of the personnel undertaking the blasting. In the case where the trench floor is founded in soil the additional depth will for purposes of this contract be termed over-excavation.

ASC 13.1.2 There will be no direct payment for the cost of removing and disposing of the volume of material removed from below the prescribed floor level or for the cost of rebuilding overbreak and over-excavation to the prescribed floor level, or for trimming the actual floor surface to the required grade and preparing it to the degree of evenness and to the specified tolerance to receive the pipe bed foundation. The cost of all these operations shall be included in the scheduled rate for preparing the trench floor set out in ASC13.2 to ASC13.6.

ASC 13.1.3 The overbreak and/or over-excavation shall be rebuilt to the prescribed trench floor level using either Class I selected fill or 38-mm stone in accordance with ASC12.1 and ASC12.4 placed in 200 mm finished thickness layers each layer compacted in accordance with the relevant specification set out below.

Selected fill : To at least 90 per cent modified AASHTO density at optimum moisture content. The Employer's Agent will determine and prescribe the degree of compaction to suit the floor condition encountered.

38-mm stone : Each layer shall be compacted by three passes of an approved "walk behind" vibratory roller with a static mass exceeding 1 000 kg.

ASC 13.2 Cleaning floor surfaces :

The Contractor shall clear and clean the floor of all disturbed material, rubble, shattered rock, mud and standing water before placing a filling layer. Each interface between filling layers shall be cleared and cleaned of all loose material, rubble, shattered rock, mud and standing water before the succeeding filling layer is placed.

ASC 13.3 Preparation of the floor where it is founded in soil of inadequate bearing capacity:

ASC 13.3.1 The bearing capacity of the material encountered at the prescribed floor level of the trench will be determined by the Employer's Agent from time to time as the excavation of the trench proceeds. Should the bearing capacity be inadequate the Contractor shall further excavate the floor to a depth to be specified by the Employer's Agent . When the bulk excavation has been approved by the Employer's Agent the Contractor shall supply and place a layer of U44 KAYMAT geofabric on the trench floor and refill to the specified trench floor level with 38-mm stone in

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accordance with ASC12.4 placed in 200 mm finished thickness layers compacted by three passes of an approved "walk behind" vibratory roller with a static mass exceeding 1 000 kg. A subsequent layer of geofabric shall be placed on top of the compacted stone before the pipes are installed.

ASC 13.4 Preparation of the floor where it is founded in suitable soil of adequate bearing capacity:

ASC 13.4.1 The Contractor shall carry out the bulk excavation to slightly above the specified pipe invert level and then after trimming and grading the surface, the floor shall be compacted to a smooth surface at pipe bed level by an approved vibratory roller to at least 90 per cent modified AASHTO density at optimum moisture content.

ASC 13.4.2 If the trench is dug to a depth below the prescribed floor level the Contractor shall at his cost, refill the over-excavation with selected fill in accordance with ASC12.1 placed in 150 mm finished thickness layers with each layer compacted to at least 90 per cent modified AASHTO density at optimum moisture content.

ASC 13.5 Preparation of the floor where there is a change in the relative compressibility at a soil-to-rock interface :

Where instructed by the Employer's Agent the Contractor shall form a transition zone by ramping the floor down as the soil-to-rock interface is approached. The ramp so formed shall be filled with Class I selected fill in accordance with ASC12.1 placed in 200 mm finished thickness layers compacted to at least 90 per cent modified AASHTO density at optimum moisture content.

ASC 13.6 Finish of trench floor surface:

ASC 13.6.1 The finished surface of the trench floor shall be a plane with a vertical alignment that does not deviate from its designed position by more than 50 mm. At points of change in the grade of the pipeline the Contractor shall obtain from the Employer's Agent a ruling on whether the trench floor grade is to be fixed between joint holes or between the grading pegs designated on the section drawing.

ASC 13.6.2 After completion of the trench floor surface the Contractor shall excavate the joint holes in accordance with the details on the drawings and clean the surface in accordance with ASC13.2.

ASC 14. CONSTRUCTION OF PIPE BED

ASC 14.1 Pipe bed foundation:

ASC 14.1.1 When the trench floor has been brought to the prescribed level the Contractor shall construct the pipe bed by placing one 150 mm finished thickness layer of Class I selected fill, in accordance with ASC 12.1 compacted to 90 per cent modified AASHTO density at optimum moisture content.

ASC 14.2 Pipe bed:

ASC 14.2.1 Immediately before the pipe is installed the pipe bed shall be boned between or set from piano wires strung between pegs placed at each pipe joint and, at each change of grade.

ASC 14.2.2 The levels, grades and lines of the finished 1 m middle width of the pipe bed shall be within 10 mm of that stated on the longitudinal section drawings. The transverse gradient of the pipe bed across the trench shall not exceed 1 to 50.

ASC 14.2.3 At points of change of grade the Contractor shall obtain a ruling from the Employer's Agent on whether the grade of the pipe bed shall be fixed between joint holes or between the survey pegs for the grading stated on the longitudinal section drawings.

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ASC 14.2.4 After completion of a length of pipe bed and its approval by the Employer's Agent the Contractor shall carry out the excavation of the joint holes and pipe lifting band holes in accordance with the details on drawings and clean the surface of the pipe bed in accordance with ASC13.2.

ASC 14.2.5 The trench shall not be considered complete for pipe laying purposes until the pipe bed, joint holes and pipe lifting band holes have been constructed by the Contractor and accepted by the Employer's Agent .

ASC 15. WORKING IN ROADS

ASC 15.1 General:

ASC 15.1.1 Before excavating the trench along or across any road the Contractor shall notify the property owners, controlling authority for the road and the Employer's Agent that the work is to be commenced and ascertain and comply with the conditions have been imposed for working in or across the road.

ASC 15.1.2 The Contractor shall arrange the work to ensure a minimum of interruption to traffic and shall be liable for any injury to persons or animals and for any damage to property or things due to negligence on the part of the Contractor or his employees.

ASC 15.2 Closing of roads:

Where permitted by the controlling authority the Contractor shall arrange for and carry out the closing of the road to traffic during the excavation and pipe laying operations and shall provide protective barriers, warning signs, lights and all other measures prescribed by the controlling authority to ensure the safety of traffic, pedestrians and animals. When the work in the road has been completed and the road surface reinstated the Contractor shall remove all barriers etc in accordance with procedures to be laid down by the controlling authority.

ASC 15.3 Construction of deviations:

ASC 15.3.1 Where the controlling authority will not permit the closure of the road the Contractor shall construct a suitable deviation to carry the traffic for the duration of the excavation and installation of the pipeline along or across the permanent road.

ASC 15.3.2 A deviation shall be constructed to the approval of the property owners, controlling authority and shall be capable of safely carrying the density and type of traffic normally using the road. The Contractor shall provide all necessary barriers, warning signs, lights and all measures required by the S A Manual for Road Traffic Signs.

ASC 15.3.3 The area on which the deviation is to be constructed shall be cleared of all vegetation and loose material by grading, loading and transporting undesirable material to suitable disposal sites.

ASC 15.3.4 Where necessary for the alignment of the deviation suitable fill material shall be provided by the Contractor and spread and compacted in 200 mm thickness layers to 95 per cent of modified AASHTO density at optimum moisture content.

ASC 15.3.5 If a cut is required to form a suitable alignment the material removed shall be set aside for subsequent reinstatement of the original ground surface after the permanent road is reopened to traffic.

ASC 15.3.6 A 150 mm finished thickness layer of suitable gravel shall be provided by the Contractor and spread and compacted over the full trafficable surface of the deviation for a minor macadamised road and a major road. The gravel surface layer shall be compacted to 95 per cent of modified AASHTO density at optimum moisture content.

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ASC 15.3.7 When the installation of the pipeline in the road has been completed the deviation shall be removed and the ground surface restored as near as possible to its original condition all to the satisfaction of the controlling authority and the Employer's Agent.

ASC 15.4 Bituminous surfaced roads:

The excavation of the trench through a bituminous surfaced road shall be carried out by the Contractor in accordance with the following procedures:

ASC 15.4.1 The edge of the trench shall be cut through both road wearing surface and foundation material using mechanical or pneumatic paving breakers, spades or rotary cutting discs to provide a clean straight edge to the trench side.

ASC 15.4.2 The wearing surface and graded crushed rock foundation material shall be removed and disposed of in accordance with ASC11.4.

ASC 15.4.3 The surface of a macadamized street shall be protected from excavation and pipelaying machinery and equipment by the spreading of a layer of spoil of at least 300 mm over the full extent of the street surface area that is to be subjected to the passage of machines and equipment. The composition and grading of the spoil and area of street surface to be covered shall be to the approval of the Employer's Agent.

ASC 15.4.4 When the procedures set out in ASC15.4.1, 2 and 3 above have been completed and approved by the Employer's Agent the excavation of the trench by machine may proceed and the utmost care shall be exercised to prevent damage to the road surface by the ripping action of the excavator bucket. The cost of reinstatement of any unreasonable damage or disintegration caused to the road surface and foundation by careless or uncontrolled operation of excavation machinery shall be recovered from monies due to the Contractor.

ASC 15.4.5 When the pipe installation has been completed and the trench has been backfilled the 300 mm layer of spoil spread to protect road and pavement surfaces shall be lashed by hand into piles, loaded up and disposed of. The removal of the remainder of the soil and the cleaning of the road surfaces and pavements shall then be carded out using hand tools such as spades, bass brooms, rakes, etc to leave the surfaces in a condition as near as may be to the original condition before excavation commenced.

ASC 15.4.6 The Employer's Agent will arrange for the reinstatement of the asphalt surface by the roads authority and payment to the roads authority will be by means of a provisional sum allowed for in the schedule of quantities.

ASC 15.4.7 Where pre-cast kerb stones and paving are liable to be damaged as a result of construction activities, the kerb stones shall be carefully removed and stored in a safe position next to the street for later re-use by the authority carrying out the reinstatement of the road. The Contractor shall be liable for the cost of replacing damaged kerb stones and paving resultant from failure to adequately protect the works, and such costs shall be deducted from any monies due to the Contractor.

ASC 16. CROSSING OF ROADS AND RAILWAYS

ASC 16.1 Minor roads:

The pipeline to be laid across any road designated as a "Minor road" shall be installed in a trench of normal width and depth for the full width of the road in accordance with the details shown on drawings.

ASC 16.2 Major roads:

The pipeline shall be laid across roads designated as "major roads" by the following means:

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ASC 16.2.1 In a trench of normal width and depth

The pipeline shall be installed in accordance with the details shown on the drawings for the full width of the bituminous surface and a minimum further length along the trench of 3 m or as otherwise ordered by the Employer's Agent from each edge of the surface. From this position to the boundary on both sides of the road the pipeline shall be installed in accordance with the details shown on the drawings for a minor road crossing. The Employer will arrange for the local authority to undertake the reinstatement of the macadamised surface and until reinstatement is completed the Contractor shall maintain the crusher run base course so that the road surface is suitable for traffic.

ASC 16.2.2 In a jacked steel pipe or existing culvert: (not applicable)

Refer to clause BSC8.

ASC 16.2.3 In a jacked concrete sleeve pipe installed by the Contractor:

Refer also to BSC8. The pipeline shall cross the road as detailed on the drawings. From the end of the sleeve to the road reserve boundary on either side of the road, the pipeline shall be installed in accordance with the details shown on the drawings for a minor road crossing.

The annulus between the 800 mm steel pipe and the concrete sleeve shall be grouted up with a cement-rich grout. (Minimum cement content = 375 kg/m³).

ASC 16.3 Railways (not applicable)

Prior to the pipe laying head reaching the railway crossing, the Contractor shall liaise with the relevant authority to obtain an "outage" of the railway line. The line shall be strapped to the authorities approval. A 1 000-mm wide trench shall be excavated beneath the railway line, and the installed pipeline shall be encased in concrete which shall extend 4000 mm either side of the railway centreline. The backfilling operation shall include for the repacking of the ballast.

ASC 17. CROSSING STREAMS, WATER COURSES AND FURROWS

ASC 17.1 Generally

ASC 17.1.1 Where the trench crosses a stream, water course or furrow the Contractor shall take all measures necessary to control the entry of water into the trench and shall design and construct any temporary embankments, diversion channel or overpass and supply and operate such pumping plant as may be necessary for this purpose. The proposed plan of the dewatering system shall be submitted to the Employer's Agent for approval prior to the installation of the system.

ASC 17.1.2 At all streams, water course and furrow crossings the Contractor shall estimate the flood that can be expected in the stream, water course or furrow and design, provide and maintain a suitable diversion channel or overpass with adequate capacity to convey the estimated flood past the excavations. Each embankment shall be of adequate height and strength and shall be arranged to train the stream flow into the channel or overpass.

ASC 17.1.3 The Contractor shall make all necessary arrangements and obtain permission from the property owners to construct the necessary diversion channel and on completion of the crossing shall refill the channel, remove embankments and clean up and reinstate the working area to the satisfaction of the owner and the Employer's Agent.

ASC 17.1.4 The Contractor shall construct all necessary embankments, causeways, fords or bridges from which the pipe installation can be undertaken across the stream, water

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course and/or furrow and associated low lying wet marshy areas, reinstate temporary works in the event of flooding or washaways, clear all temporary works after the crossing has been completed.

ASC 17.1.5 Except for shutdowns for maintenance of dewatering equipment, or other shutdowns approved by the Employer's Agent, no interruptions in the approved dewatering system procedures will be permitted during excavation operations and pipe installation. Full time surveillance, 24 hours per day, and maintenance shall be provided to avoid breakdowns.

ASC 18. PLANTATIONS AND TREES

ASC 18.1 In sections along the pipeline route it may be necessary to remove a number of trees occurring within the working strip in order to conduct excavations and pipe laying activities.

ASC 18.2 Where ornamental shrubs and fruit trees are to be removed these shall be carefully excavated and set aside without being damaged for replanting by the property owner.

WHEREVER POSSIBLE THE NATURAL FAUNA AND FLORA SHALL BE PRESERVED

ASC 18.3 On no account shall the Contractor fell or trim trees without the permission of the Employer's Agent.

ASC 18.4 The operation required shall be as follows:

ASC 18.4.1 Fell trees and coppice, remove lop and top and transport logs lop and top to suitable sites to be negotiated by the Contractor.

ASC 18.4.2 The ground shall be destumped and the stumps and roots shall be disposed of to suitable sites to be negotiated by the Contractor. No roots, stumps, logs, branches or any part of the trees shall be disposed of on or alongside the working strip.

ASC 18.4.3 All stumpholes shall be backfilled with soil.

ASC 19. FENCES AND WALLS

ASC 19.1 Permanent fences

Where instructed by the Employer's Agent, the Contractor shall provide all materials and erect a permanent fence to enclose certain areas or replace existing fences that are damaged or removed during pipe laying operations. The fence shall comprise five strands of new Campeon type galvanized barbed wire on approved galvanized fencing standards at 9 m spacings, and with approved galvanized fencing droppers at 3 m spacing between standards. The top strand shall be 1,2 m above ground level. A corner post shall comprise 100 mm diameter new galvanized tube 2,10 m long with cap plate and base plate with two 50 mm diameter new galvanized tube struts each with a base plate. Straining posts, similar to a corner post, shall be provided at spacings not exceeding 450 m.

Each post shall be set 850 mm deep in a 500 mm square by 950 mm deep 6:3:1 concrete base and each strut shall be set 250 mm deep in a 600 mm by 300 mm by 400 mm deep 6:3:1 concrete base. Straining eyebolts and staybolts shall be, galvanized and be 12 mm diameter with washers and nuts.

ASC 19.2 Temporary fences

Where instructed by the Employer's Agent, the Contractor shall provide all materials and erect a temporary fence to protect the excavations. The fence shall be of similar construction to that specified in ASC 19.1 except that a post or stay need not be galvanized and need not be set in a concrete base. A temporary fence shall remain

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in position until its removal has been authorized by the Employer's Agent . Material recovered from a temporary fence may be used in a subsequent position.

ASC 19.3 Existing fences and walls

ASC 19.3.1 Where the pipeline crosses or runs adjacent to an existing fence or wall, the fence and/or wall shall be temporarily stayed and a temporary concertina gate effected where required, to facilitate excavation and pipe laying operations. The concertina gate shall be chained and padlocked each night and over weekends and guarded during working hours when gates are open for pipeline construction. The Contractor requiring access to work in the property shall provide his own identified lock to interlink with the chain and padlock. Upon completion of all works the Contractor shall remove the temporary fences and concertina gates and restore the permanent fences and walls where necessary. Gates, shall be installed where required.

ASC 19.3.2 The Contractor shall be responsible for, and shall immediately repair, any damage caused to a fence or wall from any aspect of the pipeline construction. Where the damage to the fence or wall is caused by other parties the cost of repairs will be paid for at a rate fixed by the Employer's Agent .

ASC 19.3.3 Each fence shall be regularly patrolled and should claims arise as a result of the failure of the Contractor to timeously reinstate a fence or to detect damage to a fence, or because the Contractor has been negligent in not repairing reported damage to a fence expeditiously, or has not ensured that gates are guarded while open during working hours or padlocked outside working hours then the Contractor shall be liable for the settlement of such claims.

ASC 19.4 Security type fences

ASC 19.4.1 Where the pipeline crosses an existing security fence the Contractor shall call on the owner of the fence and make arrangements to remove temporarily or roll back a portion of the fence to permit the work to proceed.

ASC 19.4.2 During working hours the Contractor shall watch and guard the dismantled portion of the fence to prevent ingress or egress by unauthorised persons and such policy shall be to the satisfaction of the owner of the fence and the Employer's Agent .

ASC 19.4.3 Outside working hours and at weekends the Contractor shall reinstate temporarily the dismantled portion of the fence by means of removable fence panels or frames which shall be securely chained or padlocked in position to prevent ingress or egress by persons through the fence opening.

ASC 19.4.4 On completion of the work the security fence shall be reinstated to the satisfaction of the owner and the Employer's Agent .

ASC 19.5 Electrified fences

ASC 19.5.1 The provisions of ASC 19.4.1 to ASC 19.4.3 shall apply.

ASC 19.5.2 Where the pipeline runs parallel to electrified fencing the Contractor shall ensure his staff are instructed regarding the dangers of working in close proximity to said fencing. He shall also ensure no material or machinery, etc. touches the fence during construction.

ASC 19.5.3 The Contractor shall engage the services of a specialist electrified fencing sub-contractor to provide electrical continuity connections across the temporary breach in the fencing to enable all portions of the fencing to remain operational 24 hours per day.

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ASC 19.5.4 The temporary access points detailed in ASC 19.4.1 shall only be sufficient to allow the excavation operation to proceed. All other activities shall be conducted via the formal entry points in the electrified fencing.

ASC 20. SAFETY OF TRENCH AND OTHER EXCAVATIONS

ASC 20.1 The Contractor shall provide all necessary timbering and shoring of the sides of the trench. Such timbering shall consist of open planking, walling and substantial struts and shall be carried out in a workmanlike manner to the satisfaction of the Employer's Agent .

ASC 20.2 The shoring method adopted shall be compatible with the excavating, backfilling and pipe laying method and shall cause minimum restrictions to the laying of the pipes. Shores shall be designed to withstand the earth pressures exerted upon them from the trench side which shall include the superimposed loading of pipe laying equipment with pipes working at the side of the trench.

ASC 20.3 The mass of a 500 mm diameter, approximately 12,2 m long and 6 mm thick steel pipe is $\pm 1\ 000$ kg (excluding the weight of the linings)

ASC 20.4 The Employer's Agent may call upon the Contractor to timber the sides of the trench at any point that he may consider in any way dangerous. Such timbering shall be left in place until after the completion of the pipe laying at the point affected.

ASC 20.5 The Contractor shall carry out the removal of timbering immediately prior to backfilling or on the instructions of the Employer's Agent .

ASC 20.6 As an alternative to timbering the Contractor may prefer to batter the sides of the trench in accordance with the regulation promulgated under the Occupational Health and Safety Act (85 of 1993) and the latest Construction Regulations.

ASC 20.7 All battering of trench sides and forming of suitable steps to ensure the safety of the excavations are to be undertaken as a safety precaution on the part of the Contractor to comply with the requirements of the Occupational Health and Safety Act, 1993 (85 of 1993).

ASC 20.8 MAINTAINING THE SIDES OF THE TRENCH IN A SAFE CONDITION DURING EXCAVATIONS, PREPARATIONS OF TRENCH FLOOR, DELIVERY OF PIPES TO SITE, PLACING OF PIPE BED, LAYING OF PIPE, AND BACKFILLING AND THE PROTECTION OF THE TRENCH TOGETHER WITH PREVENTING GENERAL ACCESS TO THE TRENCH BY UNAUTHORIZED PERSONS, BY CHILDREN AND BY ANIMALS SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. NO UNDERCUTTING OF THE SIDES OF THE TRENCH WILL BE ALLOWED.

ASC 20.9 The Contractor shall take every precaution to prevent water from any source entering the excavations and shall keep the pipe trench free from water while carrying out excavation, preparation of the trench floor, while forming pipe bed and until the excavations are backfilled. The Employer's Agent may order additional precautions to be taken where he is not satisfied with the Contractor's arrangements. Any water, including seepage, entering the trench shall be removed immediately if directed by the Employer's Agent .

ASC 20.10 If required by the Employer's Agent , the Contractor shall leave unexcavated blocks in the trench to prevent the flow of stormwater down the trench. These blocks shall be at least 1 m thick and spaced as directed by the Employer's Agent .

ASC 21. MAINTENANCE OF OPEN TRENCH

ASC 21.1 After excavation the trench floor and/or pipe bed shall be maintained until the pipes are installed. Should the sides fall in or any debris or water accumulate in the trench

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due to any cause the trench shall be cleared and the floor made good when so directed by the Employer's Agent . After the installation of the pipes has been completed, the trench shall be maintained until its backfilling is instructed by the Employer's Agent .

ASC 22. LAYING AND JOINTING OF PIPES

ASC 22.1 The Contractor will unload and string the pipes alongside the trench and will then install the pipes in the trench and make the joints.

ASC 22.2 The pipe laying gang will NOT be allowed to move into a section of trench or excavation unless it is in a safe condition, complies with the requirements of the regulations promulgated under the Occupational and Safety Act, (85 of 1993) and is approved by the Employer's Agent and accepted by the responsible person for the installation of the pipeline.

ASC 23. FILLING OF TRENCHES

ASC 23.1 As the pipe is laid and the valve chambers, thrust anchors, sleeve/culvert brickwork and other structures are completed the Contractor shall fill in the trench without delay to the full extent as and when directed by the Employer's Agent in accordance with the details shown on the drawings. Where the Contractor has completed backfilling of the trench and tidying up of the site prior to the completion of the valve chambers, and sleeve/culvert brickwork the Contractor shall return to site to complete the reinstatement of the trenches around the chambers and brickworks.

ASC 23.2 Generally :

ASC 23.2.1 Not required

ASC 23.2.2 The 300 mm layer of soil cement grout detailed on the drawings shall not be applicable to this contract and shall be replaced by Class I selected material as per ASC23.2.3.

ASC 23.2.3 Except in roadways, the earth filling under, around and over the pipe up to 300 mm above the pipe (Stage I) shall be Class I selected material in accordance with ASC12.1 compacted by power rammers or other approved equipment in 200 mm finished thickness layers to at least 90 per cent of modified AASHTO density.

ASC 23.2.4 Except in roadways the remainder of the earth filling (Stage II), to underside of topsoil layer or to ground level, shall be Class II fill selected from the excavations or provided in accordance with ASC12.2 and placed in temporary piles in accordance with ASC11.2 recovered, refilled in the trenches and compacted by power rammers or other approved equipment in 300 mm finished thickness layers to at least 85 per cent of modified AASHTO density.

ASC 23.3 Filling of trenches at road crossings :

ASC 23.3.1 Major roads :

The filling of the trench at major road crossings shall be graded crusher run material in accordance with ASC 12.6 compacted by power rammers or other approved

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equipment in 200 mm finished thickness layers to 85 per cent of the solid density of the material.

ASC 23.3.2 Minor roads :

The earth filling of the trench at minor road crossings shall be Class I selected stabilized material in accordance with ASC 12.5 as directed by the Employer's Agent compacted by power rammers or other approved equipment in 200 mm finished thickness layers to 95 per cent of modified AASHTO density.

ASC 23.3.3 Major roads (in pipe sleeve installed by Contractor)

The sleeve pipe shall be bedded in 150 mm of river sand and filled to the overt with soil cement fill (ASC12.5) placed in 2 pours to prevent flotation. Subsequent filling shall incorporate the reinstatement of the road structural layers.

ASC 23.4 General :

ASC 23.4.1 Where required by the Employer's Agent the degree of compaction of the Stage I backfill shall be increased from 90 per cent to 95 per cent of modified AASHTO density at optimum moisture content. Similarly the Employer's Agent may instruct that the degree of compaction of the Stage II backfill be increased from 85 per cent to 95 per cent of modified AASHTO density at optimum moisture content.

ASC 23.4.2 No rock with any dimensions greater than 150 mm shall be returned to the trench. (Refer ASC12.2.1).

ASC 23.4.3 An adequate mound shall be formed over the backfilled trench to allow for settlement and suitable gaps at approximately 60 m intervals shall be left in the raised backfill to allow for stormwater drainage.

ASC 24. MAINTENANCE OF BACKFILLED TRENCHES

ASC 24.1 After completion of backfilling of the trench the Contractor shall maintain the trench and for this purpose shall patrol the trench daily for 30 days, and thereafter fortnightly for the remainder of the maintenance period. In addition the entire length of the trench shall be patrolled after each rainfall exceeding 10 mm.

ASC 24.2 During the maintenance period, the Contractor shall submit monthly patrol reports to the Employer's Agent .

ASC 24.3 The period of maintenance shall extend until twelve months after the date of the Certificate of the Employer's Agent that the whole of the work has been satisfactorily completed. Any settlement shall be filled in and made good immediately.

ASC 24.4 If instructions are issued by the Employer's Agent for any repairs and if a delay occurs in the making good of any portion of the trench, the Employer will repair the trench at the expense of the Contractor.

ASC 24.5 The Contractor shall be liable for all claims arising out of any accidents that may occur during the whole period of maintenance.

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Witness:		Witness:	



ASC 25. FIRE BREAKS

- ASC 25.1 Where directed by the Employer's Agent, the Contractor shall clear an area around the pipes, which will be placed temporarily alongside the pipe trench, of all vegetation so that no damage can be caused to the pipes by grass or veld fires. The Contractor shall maintain the fire breaks until the backfill of the trench is completed.
- ASC 25.2 On receiving an instruction to form a fire break the Contractor shall put this work in hand immediately.

ASC 26. EXPLOSIVES

- ASC 26.1 The Contractor shall, in the first instance, comply with all of the requirements contained in Health and Safety Specifications document issued by the Employer.
- ASC 26.2 The Contractor shall be responsible for the acquisition, custody, control and use of explosives on the contract and shall comply with the requirements of the Minerals Act, 1991 and Regulations and all amendments thereto and to the relevant requirements of the South African Police and other Authorities where blasting is in the vicinity of their installations and property. Copies of all returns, reports and applications to, and licenses, permits and authorities issued by such Statutory Bodies shall be furnished to the Employer's Agent by the Contractor. Nothing contained in this contract nor any approval or instruction by the Employer's Agent shall relieve the Contractor of any of his obligations and responsibilities under any Statutory Acts or Regulations existing or introduced during the period of contract.
- ASC 26.3 The Contractor shall be responsible for the siting, erection, fencing maintenance and licensing of explosive and detonator magazines required for the satisfactory performance of the Contract. Proposals for the siting shall in the first instance be submitted to and receive the approval of the Employer's Agent prior to any approach being made to the authorities concerned.
- ASC 26.4 The Contractor shall be responsible for the guarding of magazines in terms of any regulations which may be in force or come into force during the period of contract and shall comply with any instructions given from time to time by an Statutory or Local Authority in this connection.

ASC 27. BLASTING

- ASC 27.1 All blasting shall be carried out under proper control, by licensed persons, and shall be adequately protected by steel mats and/or other approved methods. The Contractor shall be liable for any damage of any nature caused by such blasting to persons, animals, materials, pipes laying alongside the trench, installed pipelines belonging to Johannesburg Water, surrounding properties, etc, and shall observe all government and/or local regulations.
- ASC 27.2 No blasting will be permitted within 30 m of existing structures or any existing pipelines and services until a specific report containing the recommendations of the Explosives Division of AECI Ltd, is approved by the Employer's Agent. The report shall recommend the detailed procedures for blasting in the various conditions encountered on the route of the pipeline such that damage to the aforementioned

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structures, pipelines and services can be avoided. Any blasting which is to be undertaken at a distance greater than 30 m from existing structures and services shall be carried out in accordance with the general recommendations of AECI Ltd, contained in published information sheets.

ASC 27.3 No blasting shall be permitted until the blasting indemnity certificate has been signed submitted to the Employer's Agent , who may prohibit the use of explosives in close proximity to buildings, pipelines, sewers or cables, etc.

ASC 27.4 The Employer's Agent 's authority to proceed with blasting shall not absolve the Contractor from his liability under ASC 27.1 and ASC 27.2.

ASC 27.5 Appropriate notices shall be served to all affected parties prior to commencement of blasting. The conditions set out in the wayleaves shall be complied with.

ASC 28. DISPOSAL OF SURPLUS SPOIL AND UNDESIRABLE MATERIAL

ASC 28.1 As the excavation of the trench proceeds all spoil from the excavations that will become surplus over the requirements for backfill shall be loaded up, transported, dumped and levelled on suitable sites, negotiated between the Contractor and the relevant owner, and the finished surface of the working space shall be in accordance with the drawings.

ASC 28.2 The assessment of the quantity of spoil to be removed shall be the Contractor's responsibility entirely and any deficit shall be made good by the Contractor without further cost to the Employer.

ASC 28.3 The undesirable material described in ASC11.4 shall be loaded transported, deposited on suitable sites, negotiated between the Contractor and the relevant owner, and levelled off as it is excavated from the trench and other excavations. No undesirable material shall be disposed of within 50 m of the trench.

ASC 28.4 No material or surplus spoil shall be disposed of either temporarily or permanently, or privately or publicly owned property unless the Contractor shall first obtain permission therefore. The Contractor shall furnish satisfactory evidence to the Employer's Agent that such consent has been obtained.

ASC 28.5 Notwithstanding ASC 28.1 above the Employer's Agent may, where circumstances permit, instruct the Contractor to spread the surplus material over the trench width and on either side of the backfilled trench in accordance with the details shown on the drawings.

ASC 29. FINAL REINSTATEMENT OF WORKING AREA

ASC 29.1 The Contractor shall restore the surface of the ground for the full width of the working areas to a condition as near as may be equivalent to that which existed at the time of beginning construction operations on each such areas.

ASC 29.2 In all areas of the working space the surface area shall be free of bumps and hollows caused by the construction activities and, where required by the Employer's Agent , bumps shall be cut away and hollows filled and lightly compacted to leave the surface of the site in smooth, even and tidy condition.

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- ASC 29.3 The surface of access ways to residential properties shall be reinstated to the owners satisfaction and any stones, gravel or other deleterious material left from spoil piles shall be removed and disposed of as in ASC28.1. All stormwater channels and drains shall be cleaned.
- ASC 29.4 In roadways the surface reinstatement shall be in accordance with the provisions of ASC15 and ASC16.
- ASC 29.5 The grassed surfaces of parks, road pavements and median islands between carriageways shall be cleared, as far as practicable, of all spoil spread over the working strip during the course of excavation and pipe laying operations, and the grassed areas shall be loosened by means of spiked rollers or other approved equipment, in order to ensure that the top soil compacted during the construction of the pipeline is rendered suitable for sustaining the growth of grasses.
- ASC 29.6 Veld grass areas shall be cleared of surplus spoil, where required, but clearing operations shall be carried out by methods that will cause as little disturbance as possible to the grass root systems.
- ASC 29.7 Where, in terms of ASC 28.5, the Contractor is instructed to spread surplus material over the trench width and on either side of the backfilled trench, the completed work shall be free of bumps and hollows and shall be graded to be smooth in appearance, even and tidy, all to the satisfaction of the Employer's Agent .

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Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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SECTION B: UNLOADING, LAYING, JOINTING ETC OF STEEL PIPES, SUPPLY AND INSTALLATION OF SPECIALS AND INSTALLATION OF VALVES.

BSC 1. GENERAL REQUIREMENTS

Under this Section of the contract the Contractor shall

- Arrange for the unloading of pipes alongside the pipeline trench.
- Install the pipes in the trenches and make the necessary joints including the flanged joints at isolating valves.
- Fabricate and install bends and form horizontal and vertical sets where shown on the drawings using steel pipe supplied.
- Supply and install the special pipe sections scheduled.
- Provide equipment and material and carry out radiographic and magnetic particles examinations of welded joints.
- Supply and install all isolating, scour and air valves.
- Make good the external coating at joints
- Make good the internal lining
- Provide equipment, make connections and carry out water tightness and structural tests of the pipeline.
- Rectify defects in the pipeline during construction and for a period of 12 months after the final date of the acceptance of the contract.
- Manufacture and supply of pipes (Refer to Section PSC for specifications).

BSC 2. PIPE DIMENSIONS

BSC 2.1 The following dimensions are provided for tendering purposes. The Tenderer should check dimensions and mass of the pipes to be laid and ensure the lifting equipment is adequate:

Outside Diameter	Wall Thickness	Length per pipe
mm	mm	m
1 118	12.0	12.192
1 016	12.0	12.192
406	6	12.192

BSC 2.2 Pipes with 400 mm ND and larger shall have external Rigid Polyurethane Coating and internal Solvent Free Epoxy Lining. Cutbacks on the coating shall be as shown on the drawings. The 406 mm ND pipes shall be flanged, all other pipes plain ended for butt-welding.

BSC 3. TRANSPORTING AND UNLOADING OF PIPES

BSC 3.1 The pipes will be transported to site by the pipe supplier.

BSC 3.2 Delivery of steel pipes to the site will be co-ordinated by the Contractor. The pipes shall be delivered along and as near as possible to the trench for the pipeline.

BSC 3.3 The Contractor shall unload the pipes from the road vehicles and string them along the trench until required. Some pipes may have to be unloaded or stacked on storage areas some distance from the trench and later carried to the sections of the trench, where they are to be laid.

BSC 3.4 The pipes at all stages, shall be protected against damage, and shall be lifted by means of approved broad-band slings.

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BSC 3.5 The use of chains, wire ropes, etc, will not be permitted and the pipes shall be supported on pipe storage mounds provided by the Contractor while in the storage areas or when placed alongside the trench. (Sawdust filled bags shall not be used).

BSC 3.6 The Contractor shall fully inspect the pipes prior to unloading and all defects shall immediately be reported to the Engineer. The Contractor shall make arrangements for the defects to be repaired.

BSC 4. HANDLING OF PIPES

BSC 4.1 The Tenderer shall state in Schedule of Quantities the plant he proposes to use for unloading and placing the pipes in the trench. All plant shall be subject to the approval of the Engineer. The plant shall be designed so as not to damage the pipes, the lining and sheeting or disturb existing pipelines.

BSC 4.2 Before placing the pipes in the trench, the measures taken to ensure the safety of the operations, the material and compaction of the trench floor and the finished line and grade of the pipe bed shall be carefully checked between survey pegs by the Contractor. The joint holes for each pipe length shall be checked by the Contractor and permission to lay obtained from the Engineer's Representative. The pipes shall then be placed in the trench, installed and jointed in accordance with the specification.

BSC 4.3 The Contractor shall keep the pipe trench and excavations free from water at all times during the pipelaying operations.

BSC 5. INSTALLING STEEL PIPES

BSC 5.1 Preparation :

BSC 5.1.1 Before a pipe or special pipe section is placed in the trench the internal and external protective coatings shall be examined visually and by means of a Holiday detector of the correct type and rating for the particular coating system. No pipe shall be laid without the permission of the Engineer's Representative. The Tenderer shall state in the Schedule of Quantities details of the equipment that will be provided to carry out Holiday detection on the site.

BSC 5.1.2 Any manufacturing defects located in the coatings shall be reported immediately to the Engineer and will be repaired by the Contractor.

BSC 5.1.3 Any damage to the sheathing caused during unloading or while the pipes are stored on the site shall be made good by the Contractor.

BSC 5.2 Cleaning of joints :

Just prior to the installation of any section of pipe, all foreign matter of every nature and all protective material shall be removed from the surfaces that are to be in contact at joints, so as to leave thoroughly clean surfaces for metal-to-metal contact in the field joints.

BSC 5.3 Laying pipe :

BSC 5.3.1 Each pipe shall be accurately laid on the prepared bed to the required line and grade. In placing pipe in the trench, the pipe shall be held by an approved sling, at least 0,4 m wide, and the pipe shall not be dragged on the bottom of the trench but shall be supported by the sling while being fitted to the adjacent pipe section.

BSC 5.3.2 After each pipe has been set into position it shall be attached to the adjoining pipe by means of an arc-welded joint. The use of dogs, clips, lugs or equivalent devices welded to the pipe for the purpose of forcing it into position will not be permitted.

BSC 5.3.3 Any dents which appear in the wall of the pipe shall be removed by the Contractor after the cause or the object causing the dent has been located and removed. The cost of removing the dent and making good the lining, wrapping and backfilling shall be borne by the Contractor.

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Volume	1	2	3			
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BSC 5.3.4 Any damage to the pipe during or after laying shall be made good and for this purpose the Engineer may require the pipe or section thereof to be removed from the trench and replaced with pipe which is free from defects.

BSC 5.4 Completing coatings at joints :

As soon as the field joints have been welded the coating at such field joints shall be completed in accordance with the following procedures:

BSC 5.4.1 External coating

After welding and the necessary examination have been carried out, the surface of the pipe to be made good shall be wire brushed, using mechanically operated tools, to remove loose rust and slag from the weld. The surface shall then be treated with Denso primer "D" and when this has dried sufficiently two successive layers of 300 mm wide Densotherm tape, or similar approved, shall be applied in accordance with the manufacturer's specification to a finished thickness of not less than 5 mm on the external surface. All air bubbles shall be excluded. No other product shall be used unless the Contractor has obtained the written permission of the Engineer. Appropriate and approved shrink sleeves may be considered as a substitute for the above specification for repair of external coatings. The final external coating specification will be supplied to the successful contractor.

All flanges shall be wrapped with two successive layers of 300 mm wide Densotherm tape, or similar approved, in accordance with the manufacturer's specification to a finished thickness of not less than 5 mm on the external surface. All air bubbles shall be excluded.

BSC 5.4.2 Internal coating

For plain ended pipes: (600mm ND and larger)

After welding of joints, a person will enter the pipe and the internal surfaces of the pipe shall be wire brushed to remove loose rust and debris. The completion of the internal cement mortar lining after welding on site shall be as shown on the drawings. The cement mortar shall comprise ordinary portland cement (CEM II 42.5) or rapid hardening cement (CEM I 42.5R), well graded sand, water and, if required, a styrene-butadiene copolymer latex (SBR) as admixture. The cement mortar shall be well mixed and of proper consistency to obtain a dense, homogeneous lining that will adhere to the pipe joint. The minimum cement water ratio shall be 2.8 by mass. The maximum sand to cement ratio shall be 1.0 by mass.

BSC 6. WELDED JOINTS

BSC 6.1 Welding :

BSC 6.1.1 Jointing by butt and/or fillet welding shall be made in accordance with approved welding techniques and to the standard specified in BSC 6.2 and BSC 6.3. All welding shall be electric fusion welding and be acceptable to the Engineer.

BSC 6.2 Butt welding shall comply with the following requirements :

BSC 6.2.1 Aligning : The edges to be joined shall be aligned so that overlap in abutting edges shall not exceed 1,5-mm.

BSC 6.2.2 Uniformity of appearance : All welds shall be substantially uniform in appearance and shall show full fusion and penetration throughout their lengths.

BSC 6.2.3 Undercut : Welds shall be substantially free from undercut and, if present,

- (i) the depth of the undercut shall not exceed 12,5 per cent of the nominal wall thickness or 1 mm, whichever is the lesser in depth and,
- (ii) the aggregate length of undercut in any 1 m length of welding shall not exceed 50-mm.

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Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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BSC 6.2.4 Weld bead tolerances: The outer weld bead shall not exceed a height of 3 mm. The inner weld bead shall not project. More than 1 mm and all excess weld metal shall be removed to the satisfaction of the Engineer.

In butt welds made from one side only a root groove may be present provided that it has a rounded outline and does not penetrate below the level of the adjacent surfaces of the parent plate.

BSC 6.2.5 Freedom from defects : The weld, heat affected zone and surrounding parent metal shall be free from cracks, porosity cavities and trapped slag.

BSC 6.2.6 Transverse tensile strength of welded joint : The welded joint shall have an ultimate tensile strength at least equal to 95 per cent of the minimum tensile strength of the parent plate.

BSC 6.3 Fillet welding shall comply with the following requirements :

BSC 6.3.1 A visual inspection shall be carried out after cleaning the slag off every fillet weld before completion of the external coatings on all field welded joints.

BSC 6.3.2 Welds shall not have a concave surface. There shall be no undercutting of adjacent plate.
Welds shall be free from cracks, slag intrusions and porosity.

BSC 6.3.3 10 % of all fillet welds shall be subjected to magnetic particle testing.

BSC 6.4 Welding tests on butt welds only:

BSC 6.4.1 The Contractor shall supply on the site all equipment, materials and personnel to carry out radiographic examination of the full length of all (100 %) the circumferential welds made during installation of the pipeline. All (100%) of the circumferential butt welds done at the factory shall also be subjected to radiographic tests.

BSC 6.4.2 Cracks, lack of complete penetration, or lack of complete fusion shall be considered injurious defects. The standard for acceptance of minor imperfections such as slag inclusions or gas pockets shall be that laid down in clauses 6.5 and 6.6 of American Petroleum Institute Standard 1104.

BSC 6.4.3 Any weld rejected as a result of radiographic examination may be repaired at the option of the Contractor and such repair shall be carried out in accordance with BSC6.5. The repaired weld shall be re-examined radiographically, and re-examination shall extend for the full length of the weld in which the repair has been carried out.

BSC 6.5 Repairs:

BSC 6.5.1 Repairs of welded joints shall be permitted. Where repairs are required the defective weld metal shall be cut out and the parent metal prepared by grinding before being re-welded to the satisfaction of the Engineer.

BSC 6.5.2 The repairs procedure, performance, and welders employed on repairs shall be qualified in accordance with Appendix B of American Petroleum Institute Standard 5L. Each repair weld shall be marked with the welder's identifying stamp.

BSC 6.5.3 On discovery of reject welds the Engineer may, at his discretion, call for additional radiographic examination at the Contractor's cost until it is shown that the necessary standard is being maintained.

BSC 7. SPECIALS

BSC 7.1 The following special pipe sections are required to be supplied:

- (a) 200 mm diameter scour pipes
- (b) Tees, bends, reducers, flanged and plain ended pieces, etc. varying in size.

BSC 7.1.1 All piping for the fabrication of specials shall be:

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Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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(i) API 5L X52 steel with a wall thickness of 6mm, unless otherwise specified.

Steel for flanges shall be in accordance with SABS 1123 to Table to suite

BSC 7.1.2 The steel plate and/or coil shall be free from seams, cracks, laminations and other injurious defects. The external diameter shall conform to the relevant dimensions given in the schedules and the outside diameter and circumference of specials with a diameter exceeding 400 mm shall be subject to tolerances of + 3 mm and ± 6 mm respectively.

BSC 7.1.3 Ends of specials shall be cleanly cut and be free from burrs. The ends shall not deviate more than 3 mm at any point from a true plane at right angles to the axis of the pipe.

BSC 7.1.4 Where pipes are to be joined by butt welding the ends shall be bevelled to an angle of 30 ± 5 degrees measured from a plane perpendicular to the axis of the pipe, and shall include a root face of $2 \text{ mm} \pm 1 \text{ mm}$.

BSC 7.2 Welding:

BSC 7.2.1 Welding shall be in accordance with BSC 6.

BSC 7.3 Welding tests:

BSC 7.3.1 The Contractor shall supply all equipment and carry out radiographic examination of the full length of all butt welds made on site. The standard of acceptances shall be that specified in BSC 6.4.

BSC 7.4 Test of material used to manufacture specials:

BSC 7.4.1 All piping used for the fabrication of specials shall be subject to an approved hydrostatic test to a pressure that will result in a stress of 85 per cent of the guaranteed minimum yield strength for the steel plate.

BSC 7.5 Repairs:

BSC 7.5.1 Repairs of welded joints shall be permitted. The procedure and standard of acceptance shall be in accordance with BSC6.5.

BSC 7.6 Cleaning:

BSC 7.6.1 Each steel special shall be thoroughly cleaned and freed from all mill scale, foreign matter or rust especially along the weld and shall be approved by the Inspector immediately before coating. The exterior and interior of the special shall be cleaned by steel shot blasting and will not be accepted unless the operation provides a roughened surface equivalent to SA 2½ of Swedish Specification SIS 055900-1967.

BSC 7.6.2 Note: This applies to small bore piping from 100 mm NB upwards. Smaller bore piping not suitable to sand blasting, shall be cleaned by pickling.

BSC 7.7 Coatings:

BSC 7.7.1 After cleaning and inspection, the external surface shall be coated with the 3LPE system. The exact coating specifications will be supplied to the successful Contractor.

BSC 7.7.2 After cleaning and inspection, the internal surfaces shall be lined as follows:

(ii) Solvent Free Epoxy with a target thickness of 600 microns (Minimum 500 microns and maximum 800 microns).

BSC 8. JACKED PIPES AND CULVERTS

BSC 8.1 The road crossings shall be constructed by installing the 1 100 mm ND and the 1 000 mm ND steel pipes in a 1 650 mm concrete pipe sleeve. The Contractor shall execute all operations necessary for this installation.

BSC 8.2 The concrete pipe sleeve shall be installed by jacking in accordance with the specifications of SABS 1200 LG. The Contractor will be allowed to use the services of a specialised pipe jacking sub-contractor, to be approved by the Engineer.

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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BSC 8.3 Pipes for jacking shall be reinforced concrete pipes SC type, class 100D manufactured to SABS 677 (latest edition). The sleeve formed of these pipes shall span across the entire road servitude. The pipes shall be laid at levels indicated on the drawings.

BSC 8.4 The steel pipe joints shall be welded on site and the completed pipe pulled through the sleeve, using appropriate guides approved by the Engineer. All precaution for not damaging the coatings shall be taken.

BSC 8.5 After securing the steel pipe in position the annulus between the pipe and the sleeve shall be grouted. The grout shall be a sand/cement (CEM II 42.5) mix with a minimum of 375 kg/m³ cement content.

BSC 9. CHANGE OF DIRECTION

BSC 9.1 Every change of direction shall be made by a set comprising a single segmental cut or a bend. A set with a deflection angle up to and including 2 degrees may be made by mitring the pipe ends at the nearest joint. Above 2 degrees deflection angle the change of direction shall be made at the chainage depicted on the section drawing. Fabrication of a set or a bend may be carried out at a workshop and delivered to the route of the pipeline for subsequent installation or fabrication may be carried out on site.

BSC 9.2 In the case of site fabrication, sets shall be made by cutting and welding the pipe while the bends shall be fabricated using steel pipe supplied for the pipeline.

BSC 9.3 In every case fabrication, testing and coating shall be carried out in accordance with BSC6 and BSC7 of the Specification and the standard of acceptance and procedure for repair shall be those stated therein.

BSC 9.4 No payment will be made for accommodating deflections up to and including 2 degrees. Items have been included in the Price Schedules for providing and installing sets and bends with deflections exceeding 2 degrees. The price for a set shall include for all cutting, preparing the cut ends, supplying both wrapper plates and welding. Where a set occurs at a joint between pipes, the cost of jointing shall be taken to be included in the item covering the set. The price shall include for the supply, cutting, preparing and welding at all segmental cuts and installing the bend. Separate items have been included in the Price Schedule for making good the coatings at sets and at all segmental cuts on bends.

BSC 10. SUPPLY OF VALVES

BSC 10.1 The valves shall be manufactured strictly in accordance with the relevant document referred to under B11.1. The aforementioned document shall be obtained by the Contractor from the Johannesburg Water or from the Engineer.

BSC 10.2 The valves shall be supplied complete with bolts, nuts and washers needed to install them in the pipeline. Compressed Asbestos Fibre (CAF) insertion gaskets approved by the Engineer shall be supplied by the Contractor.

BSC 10.3 The valves shall be flanged and shall comply with Johannesburg Water flange requirements detailed on Drawings.

BSC 10.4 All complete valves shall be subjected to the following open-end tests:

- (c) at pressures of 1.5 times the Working Pressure for material strength and soundness.
- (d) at pressures of 1.0 times the Working Pressure for drop tightness.

BSC 10.5 The Contractor shall submit general arrangement drawings showing the leading dimensions and a sectional drawing to illustrate components and materials of construction. In addition, the successful Contractor shall submit detailed working drawings of each valve type for the Engineer's approval prior to placing orders. In addition, the Contractor shall submit a quality control plan to indicate holding points and shall provide full access for inspection by the Engineer.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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BSC 11. INSTALLATION OF VALVES

BSC 11.1 Each valve shall be installed in the pipeline in accordance with the details on the Drawings.

BSC 11.2 Isolating valves:

All gate valves shall be flanged isolation valves to SABS 664, Class 40 or class 16 as specified, anti-clockwise closing. All valves 400 mm and bigger are to be supplied with an approved open gear box assembly as follows:

BSC 11.2.1 For the 200, 300 mm, 400 mm, 500mm and 900 mm Valves:

Wedge type gate valves, Pressure Rating as specified in the BoQ. Multi-Stage Spur gearing with 6:1 minimum ratio, having operating spindles on the input spindle and at a stage where the valve can be stroked without exceeding the maximum input torque of 275Nm if no differential pressure is applied to the valve. The 900 mm valve to be supplied with a 100 mm bypass valve.

BSC 11.2.2 For the 50mm and 100 mm Valves:

Resilient seal gate valve PN 40. Valves must be provided with gland seals that consist of at least two O-rings and dirt intrusion into seals and bearings must be suitably prevented.

The gears shall be robust, and machine cut, and their mounting shall be of substantial design.

Each pinion gear spindle shall be supported between two bearings or alternatively one bearing of sufficient depth to prevent misalignment of the opinion gear and spindle. The bearings shall be fitted with bronze bushes and shall be provided with grease nipple lubricating points and shall be lubricated prior to delivery. All points to be lubricated shall be fitted with 1/8-inch BSP straight nipples for grease-gun lubrication. Adequate lubrication shall be provided for all gear and indicator bushes.

All valves shall open by anti-clockwise rotation of the main spindle and gearboxes shall be fitted with an intermediate idler where necessary.

In the case of Type, A and Type B gearing a shear pin or other safety device shall be incorporated between the high and low gears to prevent damage to the valve if excessive force is applied. Two spare pins shall be attached to each valve.

Shear pins shall be easily replaced in the field. Hard-driven pins will not be accepted as shear pins.

BSC 11.3 Air valves:

Air valves must be double acting air valves of compact single chamber design with both small and large air release orifices inside the chamber. The valve must also act as a vacuum breaker, with intake capacities of 60 % of discharge rates given.

The unit measurement for valves shall be number of each described assembly.

The rate shall include supply installation and testing including for all corrosion protection, bolts, gaskets, and any other contingency work.

BSC 11.4 Water Meters:

Both 500 mm flow meters are to be electromagnetic flow meters, to be supplied, delivered, installed and commissioned.

The meter will consist of a primary head, which is to be installed in a water pipeline and a remote wall-mounted signal converter.

The principle of operation is in accordance with Faraday's Law of Induction, whereby field coils in the primary head are energized through a pulsed direct current from the signal converter.

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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The flow meter shall be of the electromagnetic type, utilising pulsed DC excitation and shall be microprocessor based. It shall be capable of measuring flow rate and flow total in both directions, with two independent totalisers to give flow for network management purposes.

There shall be separate isolated analogue (4 to 20 mA) and pulse outputs (volts free) for forward and reverse flow. These outputs shall be fully user configurable.

The accuracy shall be better than 0,15% of the reading or +/- 1 mm/s whichever is the greater, in both forward and reverse directions. The working flow range shall be 10 mm/s to 15 m/s (i.e. 1500:1).

The repeatability shall be 0,05% of the reading or better. This performance is required for water management and/or billing purposes.

The meter shall offer lifetime stable zero so that routine zeroing is not required. The meter shall automatically indicate zero flow under empty pipe sensor conditions.

The meter performance shall have been verified on a test facility that is internationally acceptable (such as NAMAS, NIST, or equivalent), such that fully traceability is assured. Laboratory traceability packs shall be available on request.

It shall be possible to verify the calibration of the complete flow system (sensor and transmitter) in-situ, without removal of, or access to the sensor. A calibration certificate shall be provided. Condition monitoring of the sensor, transmitter and interconnection cable shall be available to provide verification of long-term satisfaction field system operation. This shall be traceable and shall conform to ISO 9000 series quality standards.

The meter shall be designed and manufactured under the ISO 9000 series quality standards. The meter shall have lay lengths to current ISO standards for magnetic meters to facilitate interchangeableness of products.

The wetted materials shall be compatible with, and suitable for, the appropriate application. An internationally recognized body such as WRC, AWWA, or equal shall certify the liner. Acceptable electrodes are stainless steel, Hastelloy C, Tantalum, or Titanium.

The power supply shall be 85 - 265 v AC, 40 - 400 Hz for mains powered devices, or 24 v for DC powered devices without the need for link setting or voltage selection to allow for dips and surges without disruption.

The impedance shall be 10 to the power 15 ohms or greater so that electrode fouling does not affect signal integrity.

The meter shall be furnished with built-in grounding electrodes of the same material as the sense electrodes.

The flow sensor shall be rated IP68, and be suitable for indefinite submergence to a depth of 10 m.

Multiple diagnostic and self-monitoring functions such as empty pipe detection, low/high flow, reverse flow, flow over-range, etc. shall be standard features. Integral and dual output alarms shall be provided. Serial communication shall be provided as standard. It shall be possible to pre-commission the system using a configurator and verify all display and outputs.

Dual or triple line alphanumeric backlit display shall indicate user defined flow rate and flow total units and all menu selection shall be possible from outside the electronic housing.

Data shall be stored in non-volatile memory with a retention capacity of 10 years.

The meter software shall incorporate dual password features, to prevent inadvertent or fraudulent program or unit changes.

The electronic housing may be integral or remote and may be safety certified to FM, CENELEC, CSA.SAA, or Gost standards for international usage without the need for air purging. It shall be NEMA 4X/IP65 or better with separate electronics and termination areas

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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for enhanced protection. The system shall conform to EMC Directive 89/336/EEC to 10 V/m, for electromagnetic radiation susceptibility standards.

The tube must be lined with an approved potable water liner - neoprene or hard rubber, which will stand up to the duty and conditions specified. Vacuum conditions must be considered.

All end connections shall be flanged, drilled to SABS 1123, as specified.

A set of earth rings and copper connecting wire must be supplied with each primary head.

Electrical protection must be class IP68.

The signal converter must be of the wall-mounted type.

It must be possible to use a signal converter with any other primary head of the same make, with reasonable accuracy.

The maximum cable run between a signal converter and its primary head will be 50 m.

Power supply will be 24 V direct current with battery backup.

Easily accessible, numbered, screwed – clamp terminal blocks must be provided in the terminal boxes.

Prices for additional cable must be quoted in the Bill of Quantities.

The signal cable must have double shielding and consist of 1,5 mm² stranded drain wire, 2 x 0,5 mm² stranded insulated wire leads, first-metal foil shield, insulation, 0,5 mm² stranded drain wire, second-metal foil shield and outer sheath.

Battery powered units must have provision for intermittent energizing of the sensor field winding and a minimum battery life of two (2) years.

Output signals shall be suitable for data loggers.

The meters must be connected to the Johannesburg Water Telemetry system via the PRV Building. For this purpose, 76m of power cable must be supplied, as well as 76 m of data cable.

The unit must be free from interference voltages. The Contractor must submit details of the protection that will be provided against stray currents, ground currents and lightning. (SABS 1529- 9)

Analogue and frequency outputs must include the following features:

- Selectable as 0-20 mA or 4-20 mA
- Adjustable to 22 mA maximum
- Current output connections to suit the above
- Current output galvanically isolated
- Flow indication in either direction
- Automatic range change and selectability
- Low flow cut-off on analogue outputs
- Adjustable damping outputs
- 24 V (5 V selectable) for electronic counter (1 Ohm resistance) on frequency outputs.
- 24 V output for Electro-mechanical counter with selectable pulse width.

Frequency shall be adjustable, so that 10 to 36 x 10⁶ pulse/hour can be made to coincide with the selected maximum flow range.

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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Display to be through LCDs and must indicate totalised flow and instantaneous flow rate in selectable unit.

Totalised flow (forward and reverse) and flow rate can either appear simultaneously or flash alternatively.

Selectable status indication must be provided for:

- Errors
- Range change
- Flow direction
- Analogue and frequency output exceeded

A zero-check facility must be provided.

Meters are to be installed with comprehensive flange insulation kits.

BSC 11.5

Pressure reducing valves:

The pressure will be reduced in two steps. During the first step (or upstream PRVs) pressure will be reduced from 130 m to 65 m. The second step (or downstream PRVs) will reduce the pressure from 65 m to 25 m. Upstream PRVs will be rated PN 40 and downstream PRVs will be rated PN 16. Upstream PRVs will be of the proportional type and downstream PRVs will be of the modulated type. Upstream PRVs will be flanged to SABS 1123 table 4 000 / 3 and downstream PRVs will be flanged to SABS 1123 table 1 600 / 3. Upstream PRVs are also to be fitted with pressure transducers to be connected to Johannesburg Water telemetry. An additional 100 m of power cable and 100 m of data cable must be supplied for this purpose. The pilot stems shall be guided by a Delrin busing in the spring casing above the diaphragm and totally removed from the flow of water in the main pilot chamber. The pilots shall be self-cleaning and self-flushing by locating the outlet in the bottom of the pilot ninety degrees to the inlet.

Valves shall be hydraulically operated globe valves. The inner valve assembly shall be top and bottom guided by means of bearing bushings. The inner valve assembly shall be the only moving part and shall be securely mounted on an AISI 316 Stainless Steel stem. Lower grades of Stainless Steel shall not be acceptable. The Stainless-Steel stem shall be provided with wrench flats for ease of assembly and maintenance. Wrench flats will be fully accessible when inner valve is assembled. All pressure containing components shall be constructed of ASTM A536-65 / 45 / 12 ductile iron.

Valves shall be provided with smooth frictionless motion and maximum low flow stability with actuation being achieved by the use of Rolling Diaphragm technology.

Valves shall have a protective fusion bonded epoxy coating internally and externally to a minimum of 250 microns. The protective fusion bonded epoxy coating shall conform to the ANSI / AWWA C116 / A21.16 (current version) specification. No machining of any external parts after final coating will be acceptable to ensure a continuous coating surface throughout the entire valve.

The valve cover shall have a separate stem cap giving access to the stem for alignment check, spring installation and ease of assembly.

Valve bonnets shall be accurately located to bodies utilizing locating pins. Locating pins shall eliminate corrosion resulting from the use of uncoated ductile iron to ductile iron surfaces. Valves with lipped spigot covers shall not be acceptable due to risk of rust and difficulty in assembly.

Valves shall have the AISI 316 Stainless Steel seat and shall incorporate a two-piece seat and bottom guide design.

The valves shall form a drip-tight seal between the stationary stainless steel seat ring and the resilient disc, which has a rectangular cross-section and is retained by clamping on

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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three- and one-half sides. The resilient disc shall be constructed of EPDM for normal service conditions.

All external fasteners shall be AISI 18-8 Stainless Steel with AISI 18-8 Stainless Steel washers. Mild steel studs or bolts will not be acceptable.

All repairs and maintenance shall be possible without removing the valve from the line. To facilitate easy removal and replacement of the inner valve assembly and to reduce unnecessary wear on the guide, the stem shall be vertical when the valve is mounted in a horizontal line.

Each valve shall be air tested prior to shipment. The standard test shall include leakage test, seat leakage test, and stroke test.

The valves shall be covered by a minimum three-year (3) warranty against defects in materials and workmanship. The stainless-steel seat shall be covered by a lifetime replacement warranty.

The auxiliary control system shall be fitted with a large filter assembly, to prevent fouling of the control system. This filter shall be fitted with a transparent drain cap, which allows maintenance personnel to inspect the strainer, without the need to shut of the system, or remove the strainer from service.

The main valve body shall be fitted with a visual position indicator, to offer the maintenance personnel visual indication of the valve position, as well as opening and closing speed controls. The strainer shall have an integral blowdown valve and discharge tube for facilitate the ease of maintenance.

BSC 11.6

Level Control valves:

The 400 mm ND and 300 mm ND Level Control Valves shall have a float control pilot and have a pressure rating of Class 16, flanges shall conform to SABS 1123 table 1 600 / 3. The valve must be able to function as a two-position control valve, either fully open or fully closed. The valve must allow normal forward flow to fill the reservoir to the maximum level and then close drip-tight at the set-point. It must open to refill the tank once the level drops a fixed distance below the high-water level. The pilot valve shall have an integral delayed opening feature, which allows the reservoir to drain by 0.3 m, before fully opening. This delayed opening feature ensures that the valve does not immediately open and subsequently close on a lowering reservoir top water level (TWL). The altitude pilot system shall fully exhaust to atmosphere ensuring the valve opens fully, no modulating control shall be accepted. The pilot control shall be supplied complete with an adjustment range of between 3 m and 18 m.

Valves shall be hydraulically operated globe valves. The inner valve assembly shall be top and bottom guided by means of bearing bushings. The inner valve assembly shall be the only moving part and shall be securely mounted on an AISI 316 Stainless Steel stem. Lower grades of Stainless Steel shall not be acceptable. The Stainless Steel stem shall be provided with wrench flats for ease of assembly and maintenance. Wrench flats will be fully accessible when inner valve is assembled. All pressure containing components shall be constructed of ASTM A536-65 / 45 / 12 ductile iron.

Valves shall be provided with smooth frictionless motion and maximum low flow stability with actuation being achieved by the use of Rolling Diaphragm technology.

Valves shall have a protective fusion bonded epoxy coating internally and externally to a minimum of 250 microns. The protective fusion bonded epoxy coating shall conform to the ANSI / AWWA C116 / A21.16 (current version) specification. No machining of any external parts after final coating will be acceptable to ensure a continuous coating surface throughout the entire valve.

The valve cover shall have a separate stem cap giving access to the stem for alignment check, spring installation and ease of assembly.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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Valve bonnets shall be accurately located to bodies utilizing locating pins. Locating pins shall eliminate corrosion resulting from the use of uncoated ductile iron to ductile iron surfaces. Valves with lipped spigot covers shall not be acceptable due to risk of rust and difficulty in assembly.

Valves shall have the AISI 316 Stainless Steel seat and shall incorporate a two-piece seat and bottom guide design.

The valves shall form a drip-tight seal between the stationary stainless steel seat ring and the resilient disc, which has a rectangular cross-section and is retained by clamping on three- and one-half sides. The resilient disc shall be constructed of EPDM for normal service conditions.

All external fasteners shall be AISI 18-8 Stainless Steel with AISI 18-8 Stainless Steel washers. Mild steel studs or bolts will not be acceptable.

All repairs and maintenance shall be possible without removing the valve from the line. To facilitate easy removal and replacement of the inner valve assembly and to reduce unnecessary wear on the guide, the stem shall be vertical when the valve is mounted in a horizontal line.

Each valve shall be air tested prior to shipment. The standard test shall include leakage test, seat leakage test, and stroke test.

The valves shall be covered by a minimum three-year (3) warranty against defects in materials and workmanship. The stainless-steel seat shall be covered by a lifetime replacement warranty.

The auxiliary control system shall be fitted with a large filter assembly, to prevent fouling of the control system. This filter shall be fitted with a transparent drain cap, which allows maintenance personnel to inspect the strainer, without the need to shut of the system, or remove the strainer from service.

The main valve body shall be fitted with a visual position indicator, to offer the maintenance personnel visual indication of the valve position, as well as opening and closing speed controls. The strainer shall have an integral blowdown valve and discharge tube for facilitate the ease of maintenance.

BSC 11.7 General:

BSC 11.7.1 Flanges shall be set up and installed in the pipeline with the meeting faces plumb or level according to their position in the pipeline and with the bolt holes off centres.

BSC 11.7.2 A CAF insertion gasket shall be supplied and fitted by the Contractor between each pair of joint flanges.

BSC 11.7.3 Flange bolts shall be taken up evenly all round in sequence and then shall be set using spanner approved by the Engineer. After 24 hours, the bolts shall be reset to assure that they are tight.

BSC 12. **CLEANING**

BSC 12.1 The interior of the pipes shall be kept free from contamination at all times.

BSC 12.2 After working hours ingress of debris shall be prevented by the fitting of approved end plates. Branches and tees shall be sealed off immediately after installation.

BSC 13. **CHARGING OF PIPELINE**

BSC 13.1 On completion of the pipeline, the Contractor will arrange to fill it with water for testing in accordance with BSC 15.

BSC 13.2 Pipes laid under streams and canals shall be encased in concrete. Thereafter backfilling shall be completed and the stream restored.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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BSC 13.3 As each section of the pipeline is completed, domes shall be welded to the pipeline before it will be filled with water. Before the domes are removed and end connections completed the pipeline shall be tested as specified in BSC 15.

BSC 13.4 The connection of the new pipeline to the existing pipeline shall be made with special joint sections. The Contractor shall however supply all specials and valves required and shall provide all necessary assistance with the installation. The cutting of the existing pipelines and the welding of the special joint sections shall be carried out by the Contractor at his cost under the supervision of the Engineer.

BSC 14. MAINTENANCE

BSC 14.1 The Contractor shall be responsible for all defects in the pipeline during the construction and maintenance periods and shall immediately make good any defects that arise.

BSC 14.2 Attention is directed to the danger of the pipeline lifting if the trench becomes waterlogged while the pipe is empty.

BSC 15. ACCEPTANCE TEST OF COMPLETED PIPELINE

BSC 15.1 On completion of the laying and associated structures for a pipeline section the Contractor shall supply and install suitable blank flanges, make the necessary preparations, provide the testing equipment and carry out watertightness and structural-strength tests of the pipeline system. The length of each section to be individually tested will be defined by the Engineer.

BSC 15.2 After filling the section to be tested, the section shall be allowed to stand for a minimum of 24 hours. The Contractor shall then place the pipeline under a test pressure corresponding to the relevant design head to be advised by the Engineer.

BSC 15.3 Water shall be fed into the system through a calibrated meter and the pressure in the system measured by a calibrated gauge. The Contractor shall provide the necessary pumping system, connection, meter gauges and labour. Each test shall continue for at least three days. Any decrease in pressure shall be made up every hour and the quantity of make-up water measured. The pipeline will not be considered satisfactory until the average leakage is less than 0.1 litres/mm diameter/kilometre/24 hours/30 m head.

BSC 15.4 Any visible leak in the pipeline shall be made good by the Contractor. If any valve leaks it will be made tight by the supplier of the valve.

BSC 15.5 If the average leakage per 24 hours from each individually tested section of the pipeline is greater than that specified, the Contractor shall take immediate steps to reduce the leakage and shall at his own expense do any excavating necessary to locate and repair leaks or other defects which may develop under test, including removal of backfill already placed; shall make all repairs necessary to secure the necessary water tightness; shall replace such excavated materials, after which the test shall be repeated until the pipe under test is found satisfactory.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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SECTION C: CONSTRUCTION OF VALVE CHAMBERS, STRUCTURES, ETC.

CSC 1. GENERAL REQUIREMENTS

CSC 1.1 Under this Section of the contract the Contractor shall construct brick and reinforced concrete structures to house the isolating valves, scour valves and air valves, concrete thrust anchor blocks, and pipe support plinths along the whole of the pipeline, brick up the ends of reinforced concrete sleeves/culverts and miscellaneous general building work reinstating structures damaged during the construction of the pipeline all in accordance with the Schedule of Quantities.

CSC 1.2 The Contractor shall prevent the entry of water from any source into the excavation within which he is constructing a valve chamber or structure and keep the excavation free from water until the valve chamber and/or structure has been completed and accepted by the Engineer.

CSC 2. MATERIAL REQUIREMENTS

CSC 2.1 Cement shall be Ordinary Port Cement (CEM II 42.5) complying with SABS "ENV 197-1".

CSC 2.2 Cement shall be delivered to the site in a dry condition undamaged by exposure to the weather and shall be stored on the site in weather-proof conditions.

CSC 2.3 Sand for concrete shall be clean, sharp river sand in accordance with SABS 1083 (latest edition). It shall be free from clay, loam, lime, mica or other deleterious minerals, vegetable or organic matter and shall be approved by the Engineer before use.

CSC 2.4 Stone for concrete shall be clean, non-friable quartzite or dolomite, free from dust, excessive flat or elongated particles, dirt, clay or other impurities.

CSC 2.5 Water for concrete and mortar shall be free from injurious amounts of dissolved mineral salts, organic matter or other substances which may impair the strength or durability of concrete or mortar.

CSC 2.6 Bricks for the chambers shall be hard burnt engineering grade facing bricks e g "Maize Satin" ex Corobrik and shall conform in all respects with SABS 227 - 1986.

CSC 2.7 The Contractor shall furnish the Engineer with a sample of the bricks to be used on this contract for approval, and once approved no brick not corresponding with the sample shall be used, unless otherwise permitted.

CSC 3. CONCRETE MIX PROPORTIONS

CSC 3.1 Concrete cast shall be to the following strengths:

Class	Position
1 (minimum 28 day works cube compressive strength - 15 MPa)	Site concrete Saddles Thrust/anchor blocks Pipe surround
2 (minimum 28 day works cube compressive strength - 25 MPa)	Reinforced sections and other structural sections

CSC 3.2 Prior to commencement of the construction of the valve chambers and structures, the Contractor shall lodge with the Engineer a mix design for both Class 1 and Class 2 concrete. These designs shall be verified by casting 6, 150 mm concrete cubes for each mix design. 3 cubes of each mix shall be crushed after seven days and the other 3 after 28 days. The seven-day compressive strength shall not be less than 60 per cent of the required 28-day strengths.

CSC 3.3 During the course of the contract 6 cubes shall be made by the Contractor for each concrete pour, 3 of which shall be crushed after seven days and the other 3 after 28 days. No work

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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containing concrete with a compressive strength less than the required 28-day compressive strength, shall be accepted by the Engineer.

- CSC 3.4 The transportation, curing and crushing of the concrete cubes shall be carried out by an approved laboratory appointed by the Contractor at his own expense. Accurate records of these results shall be submitted to the Engineer as soon as they are available.

CSC 4. MORTAR

- CSC 4.1 No mortar other than cement mortar shall be used unless particularly specified or allowed by the Engineer.
- CSC 4.2 Mortar for brickwork shall be composed of four parts by volume of dry sand to one part of volume of cement. The sand for mortar shall comply in all respects with SABS 1090 Latest edition.
- CSC 4.3 Ingredients shall be mixed dry on a non-absorbent close-jointed timber or sheet-iron covered platform until the mixture is of uniform colour. Clean water is then to be added gradually through a fine rose and the mixture turned over until the ingredients are thoroughly incorporated.
- CSC 4.4 Mixing platforms shall be well cleaned and old mortar removed before any new batch is mixed.
- CSC 4.5 Mortar shall be mixed in small quantities and used immediately. No mortar that has once commenced to set will be allowed to be used.
- CSC 4.6 Horizontal joints shall be 10 mm nominal and the brickwork shall rise four courses to 340 mm.

CSC 5. BRICKWORK

- CSC 5.1 All walls shall be carried up regularly so that no part stands more than 2 courses higher than adjoining walls.
- CSC 5.2 Brickwork shall be built in a pattern comprising two stretchers and one header course. Internal faces and exposed external faces on the chambers shall be finished off smooth and fair. Joints on exposed faces shall be pointed. Brickforce shall be provided every third course between stretcher courses.
- CSC 5.3 Selected bricks of uniform size shall be used for fair faces finish above ground level.
- CSC 5.4 Where the pipeline passes through the brick end walls the opening shall be trimmed with a full circular arch of header bricks built with a 20-mm thick "Flexijoint" similar approved joint sealer between the pipeline and the brickwork. The bricks abutting this circular arch shall be neatly cut with a comb hammer or brick-cutter to the appropriate shape before laying.
- CSC 5.5 Access into air valve chambers and culverts shall be by means of 20-mm diameter hot dipped galvanized mild steel rungs which shall be supplied and built in each fourth course of the brickwork as the work proceeds. The rungs shall be well set, and any rung showing movement shall be cut out and replaced.
- CSC 5.6 Faces of bricks in contact shall be fully mortared so that vertical joints are completely filled.
- CSC 5.7 Chambers shall be built up to provide a minimum clearance of 450-mm between the top of the air valve and the underside of the roof slab.
- CSC 5.8 Three ventilation gaps, each 50-mm wide, shall be provided in each wall on the second course below the roof slab. The Contractor shall build into the wall at each of these gaps, at 150-mm section of Netlon expanded PVC mesh to prevent the ingress of vermin and other objectionable matter.
- CSC 5.9 One layer of damp-proof sheeting shall be laid on top of the brickwork to form a parting layer under the roof slab.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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CSC 6. FLOORS, WALLS AND ROOF SLAB

- CSC 6.1 The valve chamber floor shall be founded on a 50 mm thick layer of concrete blinding (where directed by the Engineer) and may be cast without shuttering. An item for blinding is included in the price schedule.
- CSC 6.2 Where chamber foundations are found to be soft they shall be compacted before any concrete is placed. Foundations in rock shall be cleared of all loose and soft material and washed down before any concrete is placed.
- CSC 6.3 A continuous strip of 6 mm thick hardboard shall be laid around the perimeter of the joint between the removable roof panel and the roof slab.
- CSC 6.4 In no case shall any concrete be placed until the Engineer has inspected the exposed surfaces and given the order to proceed with the concreting, which shall be commenced without delay.
- CSC 6.5 Properly supported shuttering shall be erected for the walls and roof slab and particular care is to be taken that no movement of the shuttering takes place while the concrete is being placed in position.
- CSC 6.6 Shuttering shall be of good material, of uniform thickness and width and the edges shall be held in place so that no distortion can occur. Shuttering to exposed concrete work shall be fair face.
- CSC 6.7 Shuttering shall be removed carefully so as not to damage the concrete and shuttering for the roof slab shall not be stripped until 7 days after concreting has taken place. No "cement bagging" of finished concrete surfaces will be accepted.
- CSC 6.8 Reinforcing mesh for the floor and roof slabs of air valve chambers shall be Fabric Ref 500. The mesh shall be fixed on supporting stools to maintain the cover of concrete shown on the drawings.
- CSC 6.9 The Contractor shall cast in the roof slab a fabricated steel manhole frame and cover accordance with the drawings.
- CSC 6.10 Brass latches to covers, where required, will be supplied and fitted by the Contractor at his own cost.
- CSC 6.11 Concrete shall be conveyed from the mixer to the point of deposition in grout tight barrows in such a way as to avoid segregation or change in water content of any part of the batch.
- CSC 6.12 The concrete shall be thoroughly compacted using approved vibrators and all concrete shall be placed in position before any initial set has taken place.
- CSC 6.13 All concrete shall be cured in a manner approved by the Engineer for a minimum period of 7 days.
- CSC 6.14 All concrete surfaces shall be clean, hard and non-porous and entirely free from honeycombing. The surfaces of the floor and roof slabs are to be puddled until the fines rise to the surface and finished off with a straight edge followed by a wood trowel. A 25 mm chamfer is to be provided on the upper and lower edges of the roof slabs and any exposed corners and the cost thereof is to be included in the rate for the shuttering.
- CSC 6.15 Except in roadways, the roof shall have a 50 mm fall to the sides, measured from the centre-line along the length of the pipe.

CSC 7. THRUST/ANCHOR BLOCKS, PIPE SUPPORTS AND ENCASING OF PIPES

- CSC 7.1 Thrust/anchor blocks, concrete encasing of pipes and pipe supports, at bends or adjacent to isolating valve chambers shall be constructed in the position and to the dimensions to be decided by the Engineer after inspecting each bend or isolating valve chamber site.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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CSC 7.2 Excavations for thrust/anchor blocks shall be trimmed neatly and shall be cleaned of loose and soft material and rock faces shall be washed down before any concrete is placed. In no case shall any concrete be placed until the Engineer has inspected the exposed surfaces.

CSC 7.3 Shuttering shall be provided to retain the concrete, while it is hardening, between the pipe and walls of the trench excavations.

CSC 7.4 The size and shape of anchor blocks at bends will be provided by the Engineer after inspecting the site.

CSC 8. STEEL REINFORCEMENT

CSC 8.1 The reinforcing bars shall comply with the requirements of SABS 920-1985. Welded mesh fabric shall comply with the requirements of SABS 1024 - 1991.

CSC 8.2 Welded joints in tensile reinforcing bars will not be permitted.

CSC 8.3 The size, length and bending of the reinforcing bars shall be strictly in accordance with the bending schedules and drawings.

CSC 8.4 All bending shall be done cold and in accordance with SABS 82 - 1976.

CSC 8.5 All reinforcement shall be clean and free from scale, loose rust, grease and oil.

CSC 9. PLACING REINFORCEMENT

CSC 9.1 The reinforcing bars shall be placed accurately in the positions and shall have the minimum cover shown on the detailed drawings. The bars shall be wired together with 1,6-mm diameter wire at every second point of intersection and shall be fixed so as to prevent any displacement during concreting. Wire tie ends shall point away from the nearest formwork face.

CSC 9.2 The Contractor shall supply all binding wire, supporting stools and spacer blocks necessary to maintain the cover of concrete shown on the drawings and shall cover the cost of same in his price for placing the reinforcement.

CSC 9.3 All placing of reinforcement shall be done well in advance of the concrete and no concrete shall be placed until the reinforcement in position has been inspected and passed by the Engineer.

CSC 9.4 Bending aside of reinforcement to facilitate placing of concrete shall be kept to a minimum and will be permitted only at certain points approved by the Engineer; such reinforcement shall be accurately re-bent to its correct shape and position before the concrete is placed round it.

CSC 9.5 Unless shown on the bending schedule, reinforcing bars shall not be cut to accommodate holes for pipes or bolts, etc. Where reinforcement interferes with a hole of pipe the bars shall be moved to position indicated by the Engineer.

CSC 9.6 Where reinforcing bars project beyond sections of concrete which are about to be cast, such projecting bars shall be firmly supported and held in position to obviate possible damage to the newly cast concrete.

CSC 9.7 Concrete spacer blocks shall be of cement sand mortar mixed in proportions by mass to be approved by the Engineer, compacted by vibration to a density equal to that of the surrounding concrete and cured as specified.

CSC 10. ACCESS RUNGS

CSC 10.1 Hot dip galvanised mild steel access rungs shall be provided in scour valve chambers and isolating valve chambers in accordance with the details on the drawings.

CSC 10.2 Galvanising shall be in accordance with the requirements of SABS 763 - 1988.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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CSC 11. PRECAST CONCRETE

CSC 11.1 Precast concrete elements shall be supplied and built into the works in accordance with Section GE of SABS 1200: Standardised Specifications for Civil Engineering Construction.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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SECTION D: MEASUREMENT AND PAYMENT

THE FOLLOWING NOTES REGARDING MEASUREMENT AND PAYMENT ARE ARRANGED TO CORRESPOND WITH THE RELEVANT ITEMS IN THE PRICE SCHEDULE TO WHICH THEY REFER

PRICE SCHEDULE A - EXCAVATIONS AND BACKFILLING PIPE TRENCH ETC.

ITEM A1 (a): SET OUT AND CONTROL LINE AND GRADE OF TRENCH

(ASC 9; ASC 10; ASC 13)

The whole cost involved in referencing existing centre line survey pegs, setting out the work, demarcating existing pipelines and controlling the line of the trench, the grade and levels of the trench floor and pipe bed, protecting pegs and beacons and the data and pegs to install the pipeline shall be included in the price tendered for the item. Payment will be made pro rata for the length of completed trench.

ITEM A1 (b): CLEAR WORKING SPACE ETC, PROVIDE PIPE LAYING PLATFORM, ACCESS ROAD, PIPE STORAGE STRIP AND THE STORAGE MOUNDS (ASC 3).

The whole cost involved in clearing the working space for excavations and pipe laying operations and for arranging for the stockpiling and depositing of the spoil from the trench to provide a continuous pipe laying platform alongside the trench, an access road for the passage of pipe delivery vehicles and for construction plant and equipment along the working strip and for a pipe storage strip and pipe storage mounds within the working strip shall be included in the price tendered for this item. In addition the price shall include for disposing the cleared material off the site, maintenance and dust and pollution control of the above work. Payment will be made pro rata to the length of completed trench.

ITEM A2: TOPSOIL (ASC 5)

Measurement for payment for excavating and stockpiling and replacing topsoil will be made of the volume of material in place before excavation with a depth of 300 mm over the width and length prescribed by the Engineer.

ITEMS A3 TO A5: EXCAVATION (SECTION A OF THE SPECIFICATION)

The measurement of quantities for payment will be the net quantities calculated from the dimensions indicated on the drawings and in the price schedule related to the work actually performed by the Contractor. Each particular item in the schedule is provisional and is subject to measurement on completion and final payment shall be made in accordance with such measurement. The rates shall include for the provision of all measures for safety as specified in ASC 20 and ASC6.5.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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Bulk excavation quantities will be measured net in place before excavation, excluding the topsoil, which is provided for in Item A2, down to the prescribed trench floor levels. Details of payment lines for excavating the trench are included on Drawing 17 (ASC6).

Joint, lifting band and stiffener holes excavation quantities (ASC7) will be measured net in place to the dimensions shown on the drawings.

Additional excavation quantities (ASC8) will be measured net to the excavation lines shown on drawings or as instructed by the Engineer.

Excavation is divided into "soft material" and "rock" (ASC4) and will be classified by the Engineer on site before the excavation is covered and before any payment is made for the excavation under examination. The Engineer's classification shall be final and binding, and any objections to the classification shall be made before the excavation has been covered. The quantities listed in the re purely provisional and payment will be made on the actual volume of each class of material as determined after the trench has been opened.

Measurement of excavation quantities will be in cubic metres.

ITEMS A6 (a) & A6 (b): PROVIDE SELECTED FILL (ASC 12.1; ASC 12.2; ASC 12.3)

Item A6 (a) is for Class I fill material and Item A6 (b) is for Class II fill material. Selected material shall be in accordance with ASC 12.1, ASC 12.2 and ASC 12.3. Where selected material is available from the spoil deposited alongside the trench during the excavations under the contract, payment will be made under items A6 (a) i) and A6 (b) i). Payment under items A6 (a) ii) and A6 (b) ii) will be for importing selected material. Items A6 (a) iii) and item A6 (b) iii) are extra over items A6 (a) i), A6 (a) ii), A6 (b) i) and A6 (b) ii) to sieve material. Items A6 (a) iv) and A6 (b) iv) shall include for locating, negotiating with the owner and establishing a borrow pit for the material. All rates for importing selected material, whether it be from a borrow pit or from the trench excavation, shall include for loading, transporting the material for a free haul of 200 m and delivery to the trench side.

The cost of obtaining, placing and compacting selected material for refilling over-excavation and overbreak shall be included in the rates for items A8(a), A8(b) and A8(c).

Measurement will be the net volume in cubic metres, of fill placed in the trench having the dimensions shown on the drawing and measured over the length instructed by the Engineer. The displaced volume of the pipe will not be taken into account for measuring purposes.

ITEMS A6(c) & (e): PROVIDE 38 mm STONE & CRUSHER RUN FILL (ASC 12.4; ASC 12.6)

38 mm stone shall be in accordance with ASC 12.4 and crusher run fill shall be in accordance with ASC 12.6. The rate for providing 38 mm stone and crusher run fill shall include all costs in obtaining a suitable material and for loading, transporting and delivering the material from any source to the trench side.

Measurement will be the net volume in cubic metres, of fill placed in the trench having dimensions shown on the drawings and measured over the length instructed by the Engineer.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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ITEM A6 (d): PROVIDE SELECTED MATERIAL FOR SOIL CEMENT FILL (ASC 12.5)

The rate shall cover the supply at the trench side of selected material in accordance with ASC

12.5.1 from any source and shall include all costs relating to the locating, loading, transporting and unloading of the material at the trench side.

ITEM A7: OVERHAUL

Haulage of material (Classes I and II) transported from a borrow pit negotiated by the Contractor or from stockpiled material along the route of the pipeline, and over a distance exceeding 200 m, will be paid for under Item A7. Measurement will be of the material in place as filling to the length and levels instructed by the Engineer, and of the actual distances exceeding 200 m covered according to the Engineer's instructions regarding the source of the material.

ITEMS A8 (a), A8 (b) AND A8(c): PREPARING THE TRENCH FLOOR (ASC 13)

The rates for preparing the trench floor whether it be in material of adequate bearing capacity (Item A8 (a)), in soil of inadequate bearing capacity (Item A8 (b)), or in unsuitable material (Item A8(c)) and shall include for:

- ASC 13.2 -Removing, clearing and disposing of rubble, debris, mud and water.
- ASC 13.1 - Supplying, placing and compacting fill to rebuild the overbreak and over-excavation and to restore the trench floor to the levels and grades stated on the longitudinal section drawings and/or prescribed by the Engineer.
- ASC 13.6 - Trimming of the trench floor to the correct levels and grades,

Measurement of preparation of the trench floor shall be in square metres calculated on the normal trench widths specified on the drawings and on the lengths for the various categories as instructed by the Engineer. No direct payment will be made for removing and disposing of material from the overbreak and/or over-excavation or for the supply of the fill for rebuilding overbreak and/or over-excavation.

ITEM A9 (a) AND (b): FILLING IN SPECIFIED OVER-EXCAVATION (ASC 13.3)

ITEM A9 (a): Supply and place U44 Kaymat geofabric (ASC 13.3.1).

The rate shall include for the removing, clearing and disposal of rubble, debris, mud and water (ASC 13.2), the supply, cutting, placing and securing of the U44 Kaymat geofabric on the floor of the cleaned trench and on top of the 38 mm stone. Measurement will be in square meters over the nett area as installed allowing for an overlap of 300 mm at joints.

ITEM A9 (b): Place and compact 38 mm stone (ASC 13.3.1)

The rates for this work shall include:

- ASC 13.2 Removing, cleaning and disposal of rubble, debris, mud and water.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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- ASC 13.3 Carry out all the necessary work for placing 38 mm stone and compacting in 200 mm finished thickness layers to the compaction specified.

The supply of the fill material is measured under Item A6(c).

Measurement will be in cubic metres to the dimensions shown on the drawings, or instructed by the Engineer, and measured over the length instructed by the Engineer.

ITEM A10: CONSTRUCT THE PIPE BED FOUNDATION (ASC 14.1)

The rates for this work shall include:

- ASC 13.2 - Removing and cleaning and disposal of rubble, debris, mud and water.
- ASC 14.1 - Carry out all the necessary work for mixing, watering, placing, and compacting in a 150 mm finished thickness layer to the degree of compaction specified.

The supply of the fill to the trench side is measured under Items A6 (a) and A6 (b).

Measurement of pipe bed foundation will be in cubic metres of the material in place to the length and levels instructed by the Engineer.

ITEM A11: FORM THE PIPE BED (ASC 14.2)

The rates for this work shall include:

- ASC 13.2 - Removing and cleaning and disposal of rubble, debris, mud and water.
- ASC 14.2.1 to ASC 14.2.5 - Form the pipe bed to the required degree of compaction and the plane surface to the tolerances.

There will be no direct payment for the supply of any additional fill required.

Measurement of pipe bed will be square metres based upon the widths of trenches shown on the drawings and the full length of the pipeline.

ITEM A12: BACKFILL (ASC 23)

The rates for backfilling shall cover the cost of placing the filling and compacting it in the trench and excavations and shall include:

- ASC 23.1, ASC 23.2 - Measure the pipe internally
- ASC 23.1 and ASC 23.2 - Filling the trench in two stages, using Class 1 selected material in Stage I (OR at the Engineer's instruction using Class II material in Stage II) and Class II selected material in Stage II in accordance with the drawings.
- ASC 23.1 - Returning to site of valve chambers and sleeves/culverts for final filling and reinstatement and remaining props on completion of surface reinstatement.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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The supply of the fill is measured under Item A6.

Measurement of backfill will be in cubic metres. The quantity backfilled shall be taken as being equal to the total net volume (excluding topsoil) excavated down to the pipe bed level shown on the section drawings plus excavation for joint holes, slots and additional excavation less the volume displaced by the pipe and other installations such as valve chambers, anchor blocks, etc.; stone and crusher run material placed; and the topsoil layers where applicable. No allowance shall be made for increased bulk due to excavation.

ITEM A13: ADDITIONAL DEGREE OF COMPACTION (ASC 23.4.1)

The additional degree of compaction shall be applied as and where directed by the Engineer. Payment will be "extra-over" item A12 for the volume of filling which has attained the additional compaction.

ITEM A14: BACKFILL WITH SOIL CEMENT FILL (ASC 12.5)

The rate shall be for the supply of cement, mixing, placing and compacting the material provided under Item A6 (d).

Measurement will be in cubic metres to the length and levels instructed by the Engineer or as detailed on the drawings.

ITEM A15: BACKFILL THE TRENCH AND OTHER EXCAVATIONS WITH CRUSHER RUN MATERIAL (ASC 12.6).

The rate shall include for placing and compacting material provided at the trench side under item A6(e) and at major roads for providing and mixing in of cement for the 300 mm deep upper road layer and all maintenance and repair until the road wearing surface has been reinstated.

Measurement will be in cubic metres to the dimensions shown on the drawing and to the length and levels instructed by the Engineer.

ITEM A16: DISPOSAL OF SURPLUS SPOIL AND UNDESIRABLE MATERIAL AND REINSTATE THE WORKING AREA (ASC 28: ASC 29; ITEM A16 (a), (b), (c) AND (d))

The rates for disposal shall include for loading, as the excavation proceeds, transporting, dumping and levelling on sites to be negotiated by the Contractor (ASC 28) and for reinstatement of the working area in accordance with ASC 29.

Measurement of surplus spoil considered to be removed from the site shall be taken as the unbulked volume of material displaced by the pipe, soil imported from external borrow pits for the soil cement fill and/or backfill, crusher-run material placed and structures with allowances made for the volume spread over the trench (Item A17) and undesirable materials disposed of in terms of ASC 11.4 and ASC 28.3.

Measurement of undesirable materials disposed of shall be based on the volume of rubble, unsuitable soft material and rock measured at the portion of the trench during the classification of the material.

Measurement of quantities disposed of will be in cubic metres.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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ITEM A17: SPREAD SURPLUS SPOIL (ASC 28.5; ASC 29.7)

Measurement will be in cubic metres of the volume in final position to the lines and thickness as directed by the Engineer and shall include for the treatment described in ASC 29.7.

ITEMS A18, A19 AND A20: CROSSING ROADS AND RAILWAYS (ASC 15 & ASC 16)

The rate for crossing roads shall be extra-over the cost of excavation under Item A3, and shall include the following.

ASC 15: Giving notice to the controlling authority and closing the road to traffic or constructing the deviation and generally complying with conditions and ensuring safety and minimum disruption.

The rate for the crossing of roads shall include for the supply, placing and compacting of the crusher-run or road gravel material which may be required for the deviation. There shall be no direct payment for crossing a track.

ITEM A20: RAIL CROSSING DETAILS (ASC 16.3) (Not Applicable)

The rate shall be extra-over the cost of excavation under A3 and shall include taking occupation, strapping the rails preserving and repacking the ballast.

Measurement will be in number of crossings.

ITEM A21: CROSSING STREAMS, WATER COURSES AND FURROWS (ASC 17)

The lump sum rate shall include for all plant, equipment and labour movement to suit the sequence of pipe laying operations. The rate shall include for notifying the owners, designing, providing and maintaining a suitable diversion channel or overpass, maintaining dewatering equipment with 24 hour surveillance and, on completion of the crossing, refilling and channel or water course, removing embankments and cleaning up and reinstating the working area. Payment will be made pro rata to the length of the completed trench.

ITEMS A22 (a), A22 (b) and A22 (c): CROSSING SERVICES (SCC 13, SCC 14, & SCC15)

The lump sum rate shall include for all plant, equipment and labour movement to suit the sequence of pipe laying operations. The rate for crossing pipelines, power lines, cables, sewers, drains, pipes, telephone equipment shall include for locating the services and notifying owners that crossing is to take place. Payment will be made pro rata to the length of trench completed.

ITEM A23: CROSSING FENCES AND WALLS (SCC 16, ASC 19.3 AND ASC 19.4)

The rate shall include for giving notice to the property owner, the temporary staying of the fence at the edges of the working strip, the careful dismantling and storing of the fence until completion of construction operations, the erecting and maintaining for a temporary fence to close the opening across the working strip at the crossing point, and upon completion of construction operations, the reinstatement of the dismantled permanent fence. Measurement for the above works described will be per crossing.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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ITEMS A24 AND A25: FENCES (ASC19.1 AND ASC 19.2)

The rates shall include the cost of supplying the wire, standards, droppers, posts and stays and the costs of clearing surface vegetation, other than trees, over a width sufficient for the erection of the fencing, the excavation and the entire cost of erecting the fencing. The rate for a permanent fence shall include for supplying and placing concrete in the post and strut bases.

Fencing will be measured in linear metres as the actual length of fencing erected as shown on the drawings or as directed by the Engineer.

ITEM A27: PUBLIC SAFETY (REFER TO PSA 8.3.3 (b))

The lump sum rate shall include all measures necessary to protect the work area and trenches during construction, including temporary fences, bridges, railings, barriers etc., in compliance with the Occupational Health and Safety Specification of the Client. Payment will be made pro rata to the length of the completed trench.

ITEM A28: FIREBREAKS (ASC 25)

Measurement will be in square metres over the area instructed by the Engineer.

ITEM A29: TREES (ASC 18) (NOT APPLICABLE)

The cost of removing and disposing of trees, coppices, forests or plantations over the width of the working strip is to be included as a lump sum and whilst clearing of veld bush and scrub is to be included in item A1 (b). Payment will be made pro rata to the length of completed trench.

ITEM A30: DISCONTINUE OPERATIONS AND TRANSFER PLANT, EQUIPMENT AND LABOUR (SCC 14)

The rate for unexpected discontinuity in operations along the route of the pipeline and transfer, plant, equipment and labour shall include everything necessary to close down in sequence the various operations in the construction train and transfer them to the new working point.

The price schedule includes items for one transfer over a plant and equipment route distance of up to 2 km and one transfer over a route distance exceeding 2 km. For purposes of classification the distance shall be measured along the shortest practical route along which the plant and equipment can be transported.

ITEM A31: PROTECT BITUMINOUS ROAD SURFACES (ASC 15.4.3 AND ASC 15.4.5)

The rate shall include for selecting, transporting and spreading suitable material in the 300 mm thick protective layer and maintaining it while the excavation of the trench, installation of the pipe and backfilling operations are in progress. The rate shall also include the collection into piles, loading the material and the

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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final cleaning of the road surfaces. The cost for eventual disposal shall be included in Items A16 and A17. Measurement shall be in square metres of road surface protected.

ITEM A32 (a) & (b): FORM AND MAINTAIN ACCESS TRACKS (ASC 3.4 AND ASC 3.5)

The rate shall include for the preparation and maintenance of all access tracks as formed on the express instruction of the Engineer. The rate shall also include for (where applicable) the obtaining, transporting, dumping, levelling and compacting of suitable material from the excavation to form the track. Forming of the working strip shall not be defined as making an access trench.

The rates shall include all work necessary to construct the access track in accordance with ASC 3.4 and to maintain it for the duration of the contract including complying with ASC 3.5.

ITEM A33: STANDING TIME COSTS

The rate shall include for overheads, plant charges, wages and all other costs incurred when the Contractor is unable to carry out the work under Schedule A of the contract, for reasons beyond his control.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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PRICE SCHEDULE B – MANUFACTURE, SUPPLY, UNLOADING, LAYING, JOINTING ETC OF STEEL PIPES

The rate for each item shall include the cost of all labour, material and the provision, operation and maintenance of the necessary plant and equipment.

Measurement for supply and transporting of pipes (Item B1) unloading pipes (Item B2), examining coatings (Item B3) and placing, installing and lining up pipes (Item B4) shall be the total length along the pegged survey line, with reference pegs offset from the centre line of the pipeline in the manner depicted on the Drawings. No deductions will be made for the length of tapers, isolating valves, sets, bends, joint gaps or the length installed in culvert crossing.

ITEM B1: SUPPLY OF PIPES (PSZ)

The rate shall include for fabrication, protective coatings and linings, testing, storage and delivery to the place of installation along the pipe trench of steel pipes as specified in the specification PSZ.

Measurement and payment will be per meter length installed (net).

ITEM B2: UNLOAD AND TRANSPORT PIPES (BSC 3; BSC 4)

The rate for unloading shall include for stringing along the trench, stacking on storage areas within 300m from the trench and transporting to the trenches as necessary.

ITEM B3: EXAMINE COATINGS (BSC 5)

The rate shall include for inspecting and repair of damaged coatings.

ITEM B4: PLACE PIPES, INSTALL AND LINE UP (BSC 4, BSC 5, BSC 6, BSC 13)

The rate shall include for trench safety measures, dewatering and checking trenches and cleaning joint surfaces and the interior of the pipeline and preventing unauthorized ingress. Allowance shall be made for a reduced rate of advance in soils which have low shear strength, at crossings of power lines, pipelines, sewers and the services covered in BSC 8.

ITEMS B5 AND B6: MAKE JOINTS AND COMPLETE COATINGS (BSC 5, BSC 7, and BSC 11)

The rate shall include the protection of the invert of the pipe, meeting tolerances, repair of defects and providing pipe-end mitres up to 2° deflection angle.

Measurement for completing coatings shall include for all joints including the socket and spigot joints or plain ended joints and each wrapper plate joint.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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ITEM B7: SETS AND BENDS (BSC 6, BSC 7, BSC 9)

The rate shall include for the supply, transporting and taking delivery of coated steel pipe at the trench side or at the specials fabrication workshop, marking, cutting, assembly and welding, coating, transport to the trench side, unloading and installation in the pipeline. The rate shall cover the supply, manufacture and installation of two wrapper plates per set or bend.

ITEM B8 AND B9: CUT STEEL PIPE

The rate shall include for marking, cutting and preparing the ends of the pipe and coatings for field welding.

ITEM B10: SPECIAL PIPE SECTIONS (BSC 6, BSC 7): VALVE CHAMBERS

The rate shall include for the supply of piping, flanges, gussets, crotch plates, bolts and gasket material, all fitting, drilling and welding and protective coatings.

ITEMS B11.1: SUPPLY AND INSTALL VALVES, METERS AND PLUG COCKS (BSC 11) (NEW VALVES AND METERS)

The rate shall include the supply, delivery, unloading, handling, transport on site from storage to the works, fitting, installation and testing of valves and meters as shown.

ITEM B 12.1: SPECIAL PIPE SECTIONS (BSC6, BSC7): NEW SPECIALS

The rate shall include for the supply of piping, flanges, gussets, crotch plates, bolts and gasket material, all fitting, drilling and welding and protective coatings.

ITEM B13: DISCONTINUE OPERATIONS AND TRANSFER PLANT, EQUIPMENT AND LABOUR (SCC 14)

The rate to discontinue operations at a point along the route of the pipeline and transfer plant, equipment and labour shall include everything necessary to close down in sequence the various operations in the construction train and transfer them in sequence to the new working plant.

The price schedule includes items for one transfer over a plant and equipment route distance of up to 2 km.

ITEM B14 (a): RADIOGRAPHIC EXAMINATION OF BUTT WELDS (BSC 6.4)

The price shall cover the full length of all circumferential butt welds done on site or in the factory with an allowance for re-examination of repaired welds. Measurement will be in number of full circumferential welds. 100% of butt welds shall be tested.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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ITEM B14 (b): MAGNETIC PARTICLE TESTING OF FILLET WELDS (BSC 6.3)

The price shall cover the full length of 10 % of all circumferential fillet welds with an allowance for re-examination of repaired welds; Measurement will be in number of full circumferential welds.

ITEM B15: ACCEPTANCE TEST (BSC 13, BSC 15)

The amount for testing shall include for everything necessary, to conduct the test, locate and repair leakage and repeating the testing until the test is found to be satisfactory.

ITEM B16: ROAD CROSSING BY PIPE JACKING (BSC 8)

- (a) Supply and install 1050 mm diameter reinforced concrete pipes SC type class 100D manufactured to SABS 677 (SABS 1200 LG – 8.2.1, 8.2.2, 8.2.6, Item 16a). The operations shall be measured in accordance with the specifications of SABS 1200 LG. The rates shall include for the excavation of thrust and reception pits, removal and disposal of surplus material within a distance of 5,0 km as well as the full reinstatement of the site on completion of the works. The quantities shall be measured in meters length completed.
- (b) Extra-over item 16a for excavation in rock (SABS 1200 LG-8.2.8).
Excavation shall be undertaken by using pneumatic tools and will be measured in m³ of excavated rock material.
- (c) Extra over item B4 for installation of a 508 mm OD steel pipe within the concrete sleeve (BSC8, Item 16c).
The rates shall provide for all additional costs (in excess of normal installation measured in Item B4) for pulling the 508 mm OD steel pipe through the concrete sleeve, for positioning, stabilising and connecting the steel pipe, etc.
- (d) Grouting of annulus between the steel pipe and the concrete sleeve (BSC 8.5, Item 16d)
The rate shall include the cost of material, grout, equipment, sealing, etc. and will be measured in m³ of annulus.
- (e) Standing time (SABS 1200 LG 8.2.10, Item B16 e)
Provisional item for standing time, beyond the control of the contractor. Payment will only be made on approval by the Engineer.

ITEM B18: STANDING TIME COSTS

The rate shall include overheads, plant charges, wages and all other costs incurred when the Contractor is unable to carry out the work under Schedule B of the contract, for reasons beyond his control. The amount will be paid only on approval by the Engineer.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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ITEMS B19, B20, B21, B22 AND B23: PROVISIONAL SUMS FOR PAYMENT TO OTHER SERVICE PROVIDERS

The provisional sums allowed will be at the disposal of the Engineer for payment for services provided by other service providers. The specified amounts will not be paid to the Contractor.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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Scope of Work

PRICE SCHEDULE C - CONSTRUCTION OF VALVE CHAMBERS, STRUCTURES, ETC (CSC)

ITEM C1 TO C3: GENERAL NOTES FOR CONSTRUCTION OF BRICK AND REINFORCED CONCRETE CHAMBERS

CSC 1. THE UNIT OF MEASUREMENT SHALL BE THE NUMBER OF EACH TYPE OF VALVE CHAMBER CONSTRUCTED COMPLETE, AS SHOWN ON THE DRAWINGS OR AS INSTRUCTED BY THE ENGINEER.

CSC 2. THE TENDERED RATES SHALL INCLUDE FULL COMPENSATION FOR ALL LABOUR, CONSTRUCTION PLANT, AND MATERIALS REQUIRED FOR THE CONSTRUCTION OF THE CHAMBERS, INCLUDING COMPACTION AND PREPARATION OF FOUNDATIONS, BINDING SEALANTS, CONCRETE SLABS, REINFORCEMENT, BRICKWORK, BRICKFORCE, STEP IRONS, VENTS, CAST IN-SITU CONCRETE AND CASTING OF ROOF SLABS, COVERS AND FRAMES.

CSC 3. THE INSTALLATION OF VALVES AND THE SUPPLY AND INSTALLATION OF SPECIALS, INCLUDING WELDING AND PROTECTION OF JOINTS IS COVERED IN PRICE SCHEDULE B.

ITEM C4: SUPPLY AND INSTALLATION OF MANHOLE COVERS

THE RATES SHALL INCLUDE FULL COMPENSATION SUPPLY AND INSTALLATION OF THE FRAMES AND COVERS IN ACCORDANCE WITH THE DRAWINGS.

ITEM C5: SUM ALLOWED FOR PAYMENT TO RAND WATER FOR THE SUPPLY OF MANHOLE COVERS

SUM ALLOWED FOR PAYMENT TO RAND WATER FOR THE SUPPLY OF SECURITY COVERS AND FRAMES. THE SUM IS PROVISIONAL AND IS ALLOWED FOR PAYMENT TO RAND WATER. THIS AMOUNT WILL NOT BE PAID TO THE CONTRACTOR.

The following for the construction of the Chamber for the PRV station

- Excavation and backfill covered in Schedule A
- Piping, specials and valves covered in Schedule B

ITEM C6: CONSTRUCTION OF FLOOR SLAB (not applicable)

The rate shall include the whole cost for preparation of the excavation surface, supply and construction of 50mm thick layer of concrete blinding, additional compaction of the foundation if instructed, supply and placing of concrete for a 200mm thick floor slab, including the installation of reinforcement mesh, final finishes etc.

The rate shall also provide for all shattering and concrete curing. The rate shall include the construction of a 300mm x 300mm x 400mm deep sump as shown.

All works to be done in accordance with specifications and as shown in the drawings.

Measurement will be square meters of complete 200mm thick slab as shown on the drawings.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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Scope of Work

ITEM C7: CONSTRUCTION OF MASONARY WALLS

The Rate shall include all works necessary to complete the 440mm thick brick walls in accordance with the specification and as shown on the drawing. The rate shall include all necessary operations, the supply and installation of bricks, brick force, air-bricks, parting strips, flexijoints, PVC mesh, step irons, etc. to achieve a complete finish as specified.

Measurement shall be per square meter of complete wall as shown on the drawings, measured on the external perimeter.

ITEM C8: CONSTRUCTION OF ROOF SLAB

The rate shall include the whole cost for the construction of the 250mm thick roof slab in accordance with the specifications and as shown on the drawings.

The rate shall include the cost for shuttering and removal thereof, cost of concrete, curing, supporting, construction of movable access slabs and manholes, the cost for placing of reinforcement, cantering, etc., all complete.

Measurement will be in square meters of complete slab as shown on the drawings.

ITEM C9: SUPPLY OF REINFORCEMENT

The rate shall include all costs for the supply, delivery and handling of reinforcement as specified.

The installation of the reinforcement is included in items C6, C8 and C10.

Measurement shall be per ton of reinforcement supplied.

ITEM C10: CONSTRUCTION OF THRUSTBLOCKS

The rate shall include all costs for the work, supply of material and finishing of concrete thrust blocks as specified.

This shall include the preparation of trench surface and foundation, additional compaction as instructed, installation of reinforcement, concrete, shuttering, curing, etc. in order to achieve complete and finished thrust blocks.

Measurement shall be cubic meters of thrust block as shown on the drawings, complete.

ITEM C11: SUPPLY AND INSTALLATION OF HOLDING DOWN BOLTS AND STRAPS

A provisional sum is allowed for this. The sum shall be at the disposal of the Engineer.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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Scope of Work

SECTION X: SOLVENT FREE LIQUID EPOXY INTERNAL LINING ON STEEL PIPELINES

Solvent Free Liquid Epoxy Internal Lining on Steel Pipelines

SCOPE

This specification covers the material and manufacturing requirements for electric welded low carbon steel pipes in sizes 100mm to 1 000mm nominal diameter to be buried in soil and to be used for the conveyance of potable water. The requirements of SANS 1217 "Guidelines for internal and external organic coating protection for buried pipelines" shall apply to all coating and lining activities. Where there is conflict between documents or standards, the Corrosion Engineer or his nominated representative must be consulted and the findings reduced to writing. All discrepancies / amendments should be raised in the pre-conference meeting and resolved before the commencement of the project. Where fruitless inspections or calls occur and costs are incurred, these costs will be back charged to the Contractor and or the material supplier should the product supplier be at fault.

Advance notice of a minimum of 24 hours shall be given by the Contractor to the appointed inspectorate body when requesting inspection of any portion of the goods for acceptance, and a minimum of 3 working days before the commencement of the contract.

The Contractor's quality control records shall be available for inspection at all times. Certified copies of these records shall be made available on request.

Notwithstanding any observation carried out by the Corrosion Engineer or his appointed representative, the Contractor shall retain full responsibility for the quality of the goods supplied under the contract.

All pipes shall be inspected on delivery to the nominated site/s and all defects shall be made good by the Contractor at his expense.

MEASUREMENT AND PAYMENT

No payment shall be made until satisfactory test certificates have been provided. Such certificates shall be posted under separate cover and not dispatched with the deliveries of pipes.

APPROVED INTERNAL LINING SYSTEMS

Specification Details for Internal Lining

The epoxy lining shall be a solvent free liquid epoxy, like TIB, 32-99, or a similar approved liquid epoxy lining. The approved supplier shall be S.A.N.S.9001 certified. **See document requirements for acceptance and approval, inspection control and sampling regiment.*

The brand type or grade, and the supplier of the solvent free liquid epoxy to be used shall be approved in writing by the Corrosion Engineer. To obtain approval, the supplier shall:

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Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



Scope of Work

- i) Provide independent test results in writing that demonstrate that the proposed lining material is capable of meeting the requirements specified in Table PLS1.1
- ii) Provide an Infrared Scan fingerprint for the material to be retained as a standard for comparison for all subsequent batches supplied to the Corrosion Engineer or his nominated representative. All random testing taken by the appointed agent / engineer and sent to a third party for testing and verification will be done for the account of the coating and lining supplier, these tests will be done at the discretion of the appointed party. It is recommended that the batches are controlled to a minimum, as the sample take may be required on each different batch.

Approval of Batches

To maintain their approved status must comply with the original specification sheet supplied at the onset of the tender.

Each batch of epoxy paint to be used by the applicator shall be approved by the Corrosion Engineer or his nominated representative before use. No change in formulation of the liquid epoxy is permitted without prior approval. Such approval shall not exonerate the contractor from the due performance of the paint systems in terms of this specification.

The manufacturer shall supply Quality Control Certificates and Infrared Scan fingerprints for each batch of material supplied. The Quality Control Certificate shall include results of tests carried out in accordance with the manufacturer's approved procedures the material will not deviate from the original specification submitted under the "specification commissioner of oath" the number of paint batches shall be kept to a minimum so as to avoid excessive costs being incurred with the Quality Control testing required prior to application of the products.

Pipes lined with epoxy paint products that have not been approved will be rejected.

Preparation and Cleaning of Pipe

- i) Degreasing
- ii) Pipes shall be degreased internally (and externally) by the use of an approved water rinse-able solvent degreaser or by passing the pipes over gas burners to carbonise contaminants.
 - a) The degreaser can be of an acidic base or alkaline base, with the pH being at least 4 points from neutral. The product to be used must be submitted for acceptance prior to use on the project.
 - b) Abrasives used for blast cleaning shall be free from oil or grease, as shall be the compressed air used in air blast cleaning. Under no circumstances will the abrasive material be acceptable for use if it has been used to blast line pipe, specials, internal or external without the steel surfaces prior to this project when the wash / degrease / oil removal process has been missed out.
 - c) Shot blast media must not have been used on cleaning of old line pipe, which has been in operation within a chemical plant, or previously buried underground. In such cases the blast material must be removed and clean un-contaminated blast material replaced and used.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



Scope of Work

- d) Process: (i) grind and remove all spikes, obtrusions and high spots and welding splatter. (ii) wash and degrease ; (iii) check for further high spots which will require grinding; (iv) shot blast to SA3 white metal, 75 micron / 100 micron profile.

iii) Blast Cleaning

The interior surface of the pipe shall be blast cleaned by centrifugal or air blast cleaning methods, then vacuum cleaned or blown off to achieve the following standards:

- Cleanliness shall be equal to Sa3 of ISO8501-1 when tested in accordance with S.A.N.S.
- The profile produced by blast cleaning shall be angular and shall have an average peak to valley height of 50 to 100 micrometers (or as recommended by the approved supplier), when tested in accordance with either S.A.N.S. 5772 or Testex Replica Tape. Spikes shall be removed with coarse abrasive paper.
- Residual dust and debris shall not exceed 0,2% when tested in accordance with S.A.N.S. 5769.
- Water soluble salts shall not exceed 100mg/ m² at any point when tested with the Weber-Reilly Reagent.
- Any laminations revealed by blast cleaning shall be ground out and re-blasted / cleaned to meet the requirements given in (a) to (d) above. If grinding penetrates the steel to a depth greater than 8% of the nominal wall thickness, the pipe shall be rejected.

iv) Handling of Cleaned Pipe

After cleaning, the pipe surface shall not be contaminated in any way. Operators shall wear clean gloves and all surfaces in contact with the pipe surface shall be clean and free from oil, grease, grit, dirt and other contamination.

v) Cut Back of Lining

The blast cleaned surface shall be stopped off or cut back by suitable masking which shall not contaminate the cleaned surface, to 100mm from both ends of the pipe.

- v) Protection of Uncoated Pipe Ends must be coated with a holding coat, such as an epoxy weld able material. The coating thickness will be a maximum of 25 micron, weathering / exposure time of 3-4 months.
Option B: Pipe ends left uncoated due to cut back of the solvent free liquid epoxy lining shall be painted with an approved weld able epoxy primer like ea9 to a dry film thickness of 15 to 25 microns. This Lining shall overlap the approved weld able primer by 20mm.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



Scope of Work

Application of Linings

- i) Method of Application General.
- ii) Use of a 2 part plural spray unit capable of applying **100% solid epoxy lining** material.
 - a) The two components shall be thoroughly and completely mixed in the proportions specified by the manufacturer.
 - b) Application shall be by dual feed hot airless equipment or by single component airless equipment recommended and in consultation by the material manufacturer.
 - c) The lining shall be applied in a uniform manner and, when cured, shall comply with all the appropriate requirements of the specifications.
 - d) The specified thickness shall be achieved in one application for solvent free epoxies. In the event of the thickness being less than the minimum specified, the lining shall be removed and the pipe length shall be re-blasted and relined to comply with the specification.
 - e) Thickness minimum 500 micron, **Target 600 microns**, maximum 800 microns.
 - f) The surface is required to be smooth and without patches or repairs. No runs, sagging/wrinkling allowed of solvent borne or 100% solid material.
 - g) The specified thickness must be achieved in multi-coat applications for **solvent borne epoxies**. When more than one coat is applied, the time interval between coats shall be not less than the minimum nor greater than the maximum specified by the manufacturer and appropriate to the pipe surface temperature.
 - h) **100% Solid** materials must be applied in one single application.
 - i) Applicators are recommended to measure wet film thickness at the time of application to avoid rejection or recoating when the dry film thickness is outside the specified limits of the specification.
 - j) The solvent based material should be applied with two different colours, this allows for a procedure of the multi-layer coating. Correct hold points and thickness testing will apply.
 - k) Thickness of Lining - 100% Solid material will have a minimum of 500 microns, **target lining 600 microns** as the designated coating finished DFT. A maximum of 800 microns will be allowed for the total system. Note the manufacturer's specifications must always be cross referenced to ensure the total system is achievable whilst remaining within the listed tolerances for the system.
- iii) Cut Back of Lining

The lining shall be cut back as specified. The lining will have a minimum cut back to the factory coating / lining of 100mm and a maximum of 120mm. (Default is 100mm cut back.)

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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iv) Repairs

- Repairs of holiday test defects may be carried out provided that the number of repairs necessary does not exceed 4 per 12 metre length of pipe.
- A cluster of pinholes within a radius of 25mm shall be regarded as one defect. This will constitute a hold point for in-depth inspection.
- Any pipe needing repairs in excess of the number given above or where the lining shows any sign of flaking or loss of adhesion shall not be repaired. The lining shall be removed and the pipe length shall be re-blasted, cleaned and recoated to comply with the requirements of the specification.

v) Method of Repair

When repairs are permissible, the following method shall be used.

- Abrade an area at least 25mm diameter around and beyond the defective area. The abrasive paper shall not be coarser than 220 mesh but preferably 400 mesh. It shall preferably be used wet to avoid excessive removal of coating. The repair area shall be abraded to a matt finish, free from deep scratches and excessive removal of coating. After abrasion, the area shall be wiped clean with M.E.K. or other suitable clean solvent and allowed to dry.
- Repair material shall be solvent free epoxy repair material from the supplier of the line pipe. The colour may differ from the colour of the epoxy lining. It shall be thoroughly mixed in the correct proportions as recommended by the supplier. The materials shall be sufficiently thixotropic that 600 microns dry film thickness can be achieved in one application without sagging. If this requirement is not achieved, the material shall be rejected.
- Repair material shall be mixed in the proportions supplied by the manufacturer. No splitting of packs shall be permitted unless the material is supplied in self-metering packs. The mixed repair material shall be applied to the clean, dry, abraded repair area so as to cover the defect and extend to within 1mm or 2mm of the edge of the abraded area. A "halo" of abraded area shall be visible around the repair material.
- After curing, the repair and at least 250mm surrounding area shall be tested by holiday test method. The resultant will be that there will be no defects.

Performance Criteria

The applied solvent free lining shall comply with all the requirements given in **TABLE PLS1.1**

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



Scope of Work

Frequency of Testing

Tests 1 to 3 of TABLE PLS1.1 shall be applied to each and every pipe.

Tests 4, 5(a) and 6 shall be applied to at least one pipe selected at random from the first day's production or from each batch of liquid epoxy whichever is more frequent.

Tests 5(b) shall be applied to at least one pipe or sample panel from each lining application run.

TABLE PLS1.1: REQUIREMENTS OF CURED SOLVENT FREE EPOXY LINING

PROPERTY	REQUIREMENT	TEST METHOD
1. Visual	Smooth glossy or semi glossy finish, free from excessive runs, sags, orange peel, occlusions or other visible defects	Use an experienced observer. NO runs to be visible on the coating .
2. Coating Thickness	Min. 500 Target 600 microns. Maximum 800 microns. Thickness readings outside this range will be assessed in terms of S.A.N.S. 1217 using a $\pm 20\%$ criteria.	S.A.N.S. Method 141. Take a minimum of 2 readings per m ² of surface up to 300mm nominal dia. , or 1 reading per m ² over 300mm.
3. Electrical Insulation Defects	Lining: Nil defects at 90 Volts, 2 MegaOhm	S.A.N.S. 1217 Section 8.12.1
4. Impact Resistance	No defect at 1 Joule	S.A.N.S. 1217 Section 8.7 but modified as given in Note 1 below
5. Degree of Cure: a) Static Test b) Dynamic Test	No softening or discolouration when fully cured No softening or discolouration when fully cured	S.A.N.S 1217 Section 8.9. Cure time shall be in accordance with the manufacturer's data. 50 double rub with cotton wool swab soaked in MEK. Cure time shall be in accordance with the manufacturer's data. See Note 2 below.
6. Adhesion (Hot water soak)	Dis-bonded length not to exceed 15mm from point of V-cut	Immerse in water at 75°C for 48 hr. Remove and make V-cut at 30 degree angle. Test adhesion when cooled to 25°C. See Note 3 below.

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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Application Procedures Two-Component Solvent-Free Epoxy Coating

Surface Preparation

Steel surfaces should be abrasive blasted to NACE No. 2/SSPCSP10, ISO 8501:1, Grade SA3. The blast profile is generally specified by the client; a typical profile is 75-100 microns. Where blast cleaning cannot be carried out, the surface should be mechanically scraped to remove all loose scale and produce a surface which is clean, dry and free from rust or dust.

Concrete Surfaces

Concrete surfaces should be lightly abrasive blasted or mechanically scarified, taking care not to expose the aggregate.

Application

Do not apply Solvent-Free Epoxy Coating when the relative humidity exceeds 90% of when the surface to be coated is less than 3°C above the dew point. The minimum temperature for application is 5°C.

The intended for application is by plural feed airless spray. Application temp should be attained by heating the Base and Activator components.

Storage

Use within 5 years of purchase or as Manufacture's specifications. Store in original sealed containers at temperatures between 5°C and 30°C. Manufacturing date to be not older than 60/80 days from manufacturing date.

Potable Water Specification (Typical properties and values)

Data Sheet and Application Guide for potable water, carrying NSF, WRAS, AFNOR, ANSI / NSF61 FACTORY CERTIFICATION.	
Product Description	Properties
Solvent-Free Epoxy Coating specifically developed as a solvent-free lining for the internals of pipes, tanks, vessels and other equipment in contact with potable water.	Colour
	Grey or Water Industry Blue
	Ratio
	2:1 By volume 2:1 By weight
	Drying & Cure times at 20°C (68°F)
	Touch Dry
	4 hours
	Hard Dry
	6 hours
	Full Cure
	7 days
	Volume Solids
	100%
Product Features	
The epoxy must combine good application characteristics with excellent corrosion protection and chemical resistance. Designed for application in a single high build coat	

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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by plural feed hot airless spray. International approvals for contact with potable water are required. Must be suitable for both steel and concrete surfaces. • Adhesion-Excellent to both blast cleaned and mechanically scraped surfaces. • Corrosion Resistance-Excellent even under aggressive immersion conditions. • Temperature Resistance-Suitable for use up to 80°C in immersion service conditions and up to 120°C in dry service conditions. General Application Steps 1. Remove oil, grease and loosely adhering deposits. 2. Abrasive blast clean steel surfaces to NACE No. 2/SSPC SP10 ISO 8501:1, Grade SA3 blast cleaning to white metal. 3. Apply linings at the specified thickness. 4. Allow to cure. 5. Visually or electrically inspect the coating for defects. 6. Repair all defects.	Shelf Life	Use within 5 years of purchase. Store in original sealed containers at temperatures between 5°C (40°F) and 30°C (86°F).
	Specific Gravity	1.48
	(Average Mixed) V.O.C.	Nil
	Film Thickness (Typical)	Wet/Dry: 600 microns.
		Note: The actual thickness to be applied should be agreed between the specifier and the manufacturer dependant on operational performance criteria and may be higher or lower than the quoted typical value. NOTE: For NSF certified applications the maximum approved thickness is 1mm (40mil)
	Theoretical Coverage Rate	2 sq meters per litre at 500 microns dft.
	Potable Water Approvals	
	UK	Regulations 31(4)a, WRAS
	France	AFNOR XP P 41-256
	USA	ANSI/NSF 61
	Canada	BNQ
	Australia	AS/NZS 4020
	Spain	OTEC
	Italy	ARPAL

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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NOTE 1

Impact resistance shall be carried out on a sample of production pipe firmly clamped and chocked (to be rebound free) to a rigid base. No electrical insulation defects shall be detected at the point of impact when tested at 1 Joule.

NOTE 2

The Degree of Cure-Dynamic Test is required to confirm that the lining applied to the pipe has the correct ratio of base to curing agent as determined by the settings on the twin feed airless spraying equipment. An >off-ratio mix produces a defective lining. To enable this test to be carried out timeously, sample panels with a maximum coating thickness of 250 micron may be force cured at 60°C for 4 hours, allowed to cool to ambient temperature, and then tested.

NOTE 3

Tests to be carried out **on a coupon cut from the pipe** with the same lining application run as the pipe. Additional tests may be required at the discretion of the engineer.

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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PARTICULAR PROJECT SPECIFICATION Y: SPECIFICATION FOR RIGID POLYURETHANE COATING AND SOLVENT FREE LIQUID EPOXY LINING ON API 5L STEEL PIPE

1. Scope

This Specification defines the minimum technical requirements for Liquid Applied Coating and lining for factory coated pipe and specials. The external coating system shall comprise a layer of rigid polyurethane applied in a single coating operation to a thickness of 1.7mm. The internal lining system shall comprise plural component hot applied solvent free epoxy to a thickness of 600µm

The contractor's scope shall include, but not necessarily be limited to the following:-

- Pre cleaning
- Surface preparation
- Application
- Testing of applied coating

The pipeline will be buried and will be protected against external corrosion by external coating and cathodic protection systems.

The external coating shall be suitable for the operating conditions applying to this pipeline and shall have proven good resistance to cathodic disbondment and cathodic over potential. This document supplements the requirements of other project Specifications and Standards for the performance of the work.

Note: The connotation of the following words will be:

- **Shall** – denotes that the requirement is mandatory.
- **Should** – denotes that the requirement is highly recommended but not mandatory.
- **Approved or Approval** – denotes approval in writing by the Corrosion and Coating Engineer of Johannesburg Water (CCE) or his nominated representative/s.

2. Contractor's Responsibilities

The Contractor shall obtain the CCE's Approval for any deviation from this Specification or referenced code, standard or project document, in writing at time of tendering. Changes requested later are likely to be rejected. In the event of any conflict between this Specification, any referenced documents and the Project Data Sheet; the Contractor shall request written clarification of the requirements from the CCE.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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Scope of Work

Only subcontractor's approved by the CCE shall be employed.

2.1 Standards and Codes

Coatings shall be applied in accordance with the requirements of this Specification and the Manufacturers' Specifications.

The order of precedence between this Specification and industry documents is:

- Project Specifications
- Project Datasheet
- Manufacturer's Specifications
- Standards and Drawings
- Industry Codes and Standards

3. Quality System

The coating operation shall be governed by a documented Quality System, which ensures that the requirements of this Specification are met in every respect.

The Quality System shall be based upon recognized quality standards, of which ISO 9001 is a suitable example. Quality Assurance systems to other equivalent standards may be used if approved by the CCE.

The Contractor Quality Assurance Group shall have been established, which shall be responsible for reviewing the Quality System and ensuring that it is implemented.

Application and test procedures, which comprise the Quality System and the Inspection & Test Plan, shall be submitted to the CCE for Approval.

The Quality System shall include control of material and equipment suppliers and subcontractors and shall ensure that the requirements of this Specification are satisfied by the suppliers and subcontractors operating quality systems in their own organizations. A Quality Plan and Inspection & Test Plan for the activities necessary to satisfy the requirements of the Specification shall be prepared and issued to the CCE for Approval before commencement of work.

The Quality Plan and Inspection & Test Plan shall include any sub-contracted work and the sub-contractor's Quality Plans shall be submitted to the CCE for Approval.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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The Quality Plan shall be sufficiently detailed to indicate sequentially, and for each discipline, the requisite quality control, inspection, testing, and certification activities with reference to the relevant procedures and the acceptance standards.

The Quality System and associated procedures may, with due notice, be subject to formal audits by the CCE.

The application of quality control will be monitored by the CCE's inspectors, who will witness and accept on behalf of the CCE the inspection, testing, and associated work required by the Specification. The provision of inspection services reporting directly to the CCE shall in no way relieve the Contractor of the responsibility to ensure that the full scope of work is carried out entirely in accordance with the Specification, the agreed Quality Plan and Inspection & Test Plan.

3.1 Functional Requirements

The coating shall be applied to provide corrosion protection to the pipeline and specials over the design lifetime. Contractor shall demonstrate that the coating system will fulfil the requirements before production starts.

This shall be demonstrated by complying with the coating qualification procedures herein. Contractor shall demonstrate that the coating, as applied during normal production, fulfils the requirements by effective quality control procedures in accordance with this specification.

Preference will be given to materials that do not require post application heating to facilitate cure.

The coating shall be suitable for use with cathodic protection and at ambient temperatures.

3.2 Technical Requirements

Application shall be by an approved, qualified, and experienced specialist coating contractor. The specialist contractor shall submit a full and comprehensive documentation package demonstrating a long term track record of successful completion of identical scopes of work on projects of the same scale.

3.3 Materials

The required external coating shall be a two-component liquid applied rigid polyurethane. The required internal coating shall be a two component liquid applied solvent free epoxy. A valid potable water certificate

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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must accompany the data sheet of the material to be used. The minimum documentation to be provided is detailed at Table 2.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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3.4 Coating Material Requirements

The two coating components shall have different colours allowing the verification of the correct mixing and checking of the uniformity of the colour of the mixed product.

The external coating is considered cured when it has attained the hardness recommended by the product manufacturer and has passed an adhesion test in accordance with Table 3

The coating materials shall be handled, stored, applied, and cured in accordance with the recommendation of the material manufacturers.

Contractor shall submit, with the quotation, certified test reports and data as listed in BS EN 10290, Table 1 and SANS 1217 Tables 1 and 3 as applicable. Requirements additional to those of BS EN 10290, Table 1 are detailed in Table 2 of this specification

3.5 Surface Preparation

All inspection and testing associated with surface preparation shall be based on BS EN 10290, Section 8 and, where necessary, modified as shown in Table 4 of this specification. Prior to blast cleaning, all surfaces shall be inspected and any oil or grease shall be removed by means of solvent cleaning in accordance with SSPC SP1 using water dispersible cleaners. The solvent shall leave no residue.

Surfaces that have been exposed to a marine or polluted atmosphere shall be fresh water or chemically cleaned to remove any chlorides or other salts to comply with requirements of ISO 8502-6 of less than 20 mg/m² equivalent NaCl.

At the start of each shift, after the compressor has reached operating temperature, the compressed air shall be checked for oil and water contamination in accordance with ASTM D4285

Using dry blasting techniques, the surfaces to be coated shall be abrasive blast cleaned to remove all mill scale and other impurities from the steel surface.

Blast cleaning abrasive shall be of the expendable type approved by CCE. Compressed blasting air shall be clean, dry and free from oil.

The air temperature, humidity, and pipe temperature shall be measured and recorded.

The surface of the pipe shall be blast cleaned as per ISO 8501-1 to Grade Sa 3 surface preparation quality at the time of coating.

The abrasive material shall be selected to achieve a surface profile of a minimum of 50 µm and a maximum of 100 µm, and as qualified during PQT. Hardness of the abrasive material must be Rockwell C 54 or greater.

The abrasive material shall be dry, clean, and free from contamination.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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Salt contamination tests shall be regularly performed on abrasive to verify that total salt level in the soluble contaminants is less than 25ppm.

The method of measurement shall be by an electronic stylus rugosity-type device during qualification to assess profile height and profile density and correlate this with Testex replica tape.

The agreed standard of surface cleanliness and profile height and density achieved during qualification shall be set as the standard for all coating work.

Spot checks using the electronic stylus rugosity device shall be carried out during production as directed by the CCE.

Measurements shall be made with Testex replica tape in accordance with NACE RP0287.

Any loose dust or contamination from the blasting process shall be removed by use of dry clean compressed air, brush, or vacuum cleaner.

The surface of the joint area shall be checked for dust contamination in accordance with ISO 8502-3. The joint surface shall have a dust rating of ≤ 2

3.6 Visual Inspection of Cleaned Surfaces

The CCE shall have final approval on the disposition of pipes, bends, specials and fittings whether or not to release those items for coating, to return for re-cleaning, or to reject the item(s) for excessive surface defects.

3.7 Surface Defects

After blast cleaning, the items shall be thoroughly inspected for surface defects such as raised slivers, laminations, or hackles of steel visible on the surface.

The defects shall be removed in accordance with the project requirements.

Items formed from pipe with surface defects, which are considered to require extensive grinding, shall be removed from the production process for further investigation.

Extensive grinding shall not be performed without Engineer approval. Anchor pattern shall be restored on all ground surfaces.

3.8 Wall Thickness

After extensive grinding, which must be approved, the remaining wall thickness shall be measured by ultrasonic inspection and shall not be less than the specified minimum wall thickness.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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Items formed from pipe with thickness less than the specified minimum wall thickness shall be rejected. Ground areas shall merge smoothly with the surrounding pipe surface.

3.9 Elapsed Time until Coating

The total allowable elapsed time between completion of the blast cleaning operation and commencement of the coating operation shall be kept to a minimum such that the surface cleanliness is Sa 3 at the time of coating. Delay shall not exceed the times provided in Table 1 below.

Table 1

Time-Humidity Table for Blasting – Coating delay

% RELATIVE HUMIDITY	ELAPSED TIME (HOURS)
85	0.5
80	1.0
70	1.5
60	1.75
50	2.0

Relative humidity and dew point temperature shall be determined using a sling psychrometer or digital hygrometer in the immediate vicinity of the abrasive blast cleaning equipment.

No surface preparation by abrasive blast cleaning or coating application is to be performed unless the RH < 85% and surface temperature is more than 3°C above the Dew Point.

3.10 Coating Application

All coating activities shall be performed in accordance with the approved procedures.

The surface shall be heated using an induction heating coil, radiant heaters or hot air to a temperature as recommended by the coating material manufacturer and in accordance with this specification

The use of propane torches or gas burners for pre-heating and post-heating is expressly prohibited. Infrared heaters may be used for post-heating.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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The temperature of the bare steel shall be monitored using temperature-indicating crayons. The amount of crayon used shall be the minimum amount required for accurate measurement. Crayon markings shall be removed with a wire brush.

Care shall be taken to ensure a uniform heating pattern.

3.11 Liquid Coating Application

A layer of liquid coating shall be applied to the blast cleaned surfaces using the method and equipment recommended by the product manufacturer. 100% Solid material should have a dry film thickness (DFT) of 600µm and shall be a minimum of 500µm. A maximum of 800µm will be allowed for the total system.

Note the manufacturer's specifications must always be cross referenced to ensure the total system is achievable whilst remaining within the listed tolerances for the system.

The required minimum dry film thickness in terms of SSPC PA2 is 1.7mm for the external coating.

100% Solid materials must be applied in one single application. The specified thickness shall be achieved in one application for solvent free epoxies. In the event of the thickness being less than the minimum specified, the lining shall be removed and the pipe length shall be re-blasted and relined to comply with the specification. For factory-coated pipe, bends and specials the cut back shall be 150 ±20mm. The edge of the cut-back shall be feathered at 30 – 45°.

The coating shall be uniform, free of defects and shall not show a tendency to laminate, to sag or to curtain.

If post-heating of the coating after application is required, this shall also be carried out in accordance with the product manufacturer's procedure, and as qualified during Quality Control Planning phase.

The wet film thickness shall be measured in accordance with ISO 2808.

Particular attention shall be paid to the recommended dry film thickness which shall be measured in accordance with SSPC PA 2.

No spot measurement may be less than 1.5mm for the polyurethane and 500µm for the epoxy.

No thinner shall be used unless recommended by the product manufacturer.

Tools and equipment shall be cleaned using only such solvents as are recommended by the product manufacturer.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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Particular care shall be taken in the handling of the coated items before the coating has reached the minimum value of hardness recommended by the manufacturer and qualified during the rock impact test.

All pipes and other components shall be high spark holiday tested in accordance with NACE RP0274 at the test voltage recommended by the coating manufacturer.

3.12 Repairs

Repairs shall be carried out with repair grade materials of the same grade as the spray-applied, and tested in accordance with approved procedures.

4. Data and Quality Requirements

Table 2:

Data Requirements for System Pre-Qualification Additional to BS EN 10290, Section 3, Table 1

PROPERTY	TEST METHOD	ACCEPTANCE CRITERIA
Hardness Shore "D"	ASTM D2240	≥75
Composition	FTIR Fingerprint	
Contractor shall submit data regarding specific curing times to touch dry, dry to handle and full cure for steel temperatures of 10, 20, 30, 40 & 50°C		

(Note: The coating is equivalent to type 1 thickness class B of BS EN 10290 clause 1)

Table 3:

Requirements for Procedure Qualification Additional to BS EN 10290, Section 7, Table 4

PROPERTY	TEST METHOD	ACCEPTANCE CRITERIA
Cathodic disbondment, 66 ± 3°C, 24 hrs, 3.5V	NACE RP 0394	<6mm
Adhesion to steel after hot water soak, 70 ± 3°C, 30 days and 60 days	ISO 4624	≥7MPa
Impact resistance	ASTM G14, 23°C	3J/mm
Interface porosity	NACE RP 0394	1-2
Cross section porosity	NACE RP 0394	1-2
Employer:		Contractor
Witness:		Witness:

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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Table 4:

Requirements for Quality Control Testing From BS EN 10290, Section 8, Table 5 and or this Specification

Properties
Surface condition before blast cleaning
Dimension, shape and properties of blast cleaning products and checking of the blast cleaning process
Abrasive salt levels
Roughness of the blast cleaned surface
Visual condition of the blast cleaned surface
Temperature of pre-heating, before coating, if necessary
Temperature of post-heating, after coating, if necessary
Temperature and humidity
Wet thickness of the coating system
Dry thickness of the coating system
Appearance and continuity
Holiday detection
Hardness Shore "D"
Infrared scan, check against manufacturer's data
Adhesion test - Pull off method (1)
Cut back (factory-coated items)

Note 1: Field pull-off adhesion testing shall be carried out on an offline spool or adjacent to the cut-back on production pipe, every shift.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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Publications

The following publications form part of this specification. Unless otherwise specified herein, the latest edition as at the date of this specification shall apply.

ASTM–American Society for Testing and Materials

ASTM D2240	Standard Test Method for Rubber Property (Durometer Hardness)
ASTM D4541	Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
ASTM G14	Standard test method for impact resistance of pipeline coatings (Falling Weight Test)
ASTM D4285	Standard Test Method for Indicating Oil or Water in Compressed Air

BS EN–British Standard European Norm

BS EN 10290	Steel tubes and fittings for onshore and offshore pipelines – External liquid applied polyurethane and polyurethane-modified coatings

ISO–International Organization for Standardization

ISO 1514	Paints and varnishes -- Standard panels for testing
ISO 2808	Paints and varnishes – Determination of film thickness
ISO 4624	Paints and varnishes – Pull off test for adhesion
ISO 8501-1	Preparation of Steel Substrates Before Application of Paints and Related Products - Visual Assessment of Surface Cleanliness - Part 1: Rust Grades and Preparation Grades of Uncoated Steel Substrates and of Steel Substrates After Overall Removal of Previous Coatings
ISO 8502	Preparation of steel substrates before application of paints and related products - Tests for the assessment of surface cleanliness
ISO 8503	Preparation of Steel Substrates Before Application of Paints and Related Products – Surface Roughness Characteristics of Blast-Cleaned Steel Substrates Part 1: Specifications and definitions for ISO surface profile comparators for the assessment of abrasive blast-cleaned surfaces. Part 2: Method of grading of surface profile of abrasive blast-cleaned steel-comparator procedure. Part 4: Method for the calibration of ISO surface profile comparators and for the determination of surface profile - Stylus instrument procedure. Part 5: Replica tape method for the determination of surface profile.
ISO 8504-2	Preparation of Steel Substrates Before Application of Paints and Related Products - Surface Preparation Methods - Part 2: Abrasive Blast Cleaning

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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ISO 11124-1	Preparation of Steel Substrates Before Application of Paints and Related Products - Specifications for Metallic Blast Cleaning Abrasives- Part 1: General introduction and classification Part 2: Chilled iron grit Part 3: High-carbon cast-steel shot and grit Part 4: Low-carbon cast-steel shot

NACE - National Association of Corrosion Engineers

ASTM D 4285	Method for indicating Oil or Water in Compressed Air
NACE RP0274	High-Voltage Electrical Inspection of Pipeline Coatings Prior to Installation
NACE RP0287	Field Measurement of Surface Profile of Abrasive Blast Cleaned Steel Surfaces Using a Replica Tape
NACE SP0394	Application, Performance, and Quality Control of. Plant-Applied, Fusion-Bonded Epoxy External Pipe

SSPC--Steel Structures Painting Council

SSPC SP11	Power Tool Cleaning to Bare Metal
SSPC PA 2	Measurement of Dry Coating Thickness with Magnetic Gauges (Steel Structures Painting Manual, Ch 5 - Paint Application Specs.)
SSPC SP1	Solvent Cleaning

South African Bureau of Standards

SANS 1217	Internal and External Organic Coating Protection for Buried Steel Pipelines
SANS 241	Drinking water

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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PART 1: GENERAL CONDITIONS AND SPECIFICATION

SECTION Z: SPECIFICATION FOR THE FABRICATION, COATING AND DELIVERY TO SITE OF STEEL PIPES.

PSZ 1. APPLICABLE STANDARDS

PSZ 1.1 Reference is made to the latest issues of the following standards:

PSZ 1.1.1	SABS 763	Hot-dip (Galvanized) Zinc Coatings (other than on continuously Zinc-coated sheet and wire).
PSZ 1.1.2	SABS 1178	The Production Of Lined And Coated Steel Pipes Using Bitumen Or Coal Tar Enamel.
PSZ 1.1.3	SABS 1217	The Production Of Painted And Powder-coated Steel Pipes.
PSZ 1.1.4	SABS 044 pt 1	Glossary of Terms.
PSZ 1.1.5	SABS 054	Tensile Testing Of Metallic Materials.
PSZ 1.1.6	DIN 50049	Material Testing Certificates.
PSZ 1.1.7	AWWA C205	Protection of steel pipes
PSZ 1.1.8	SABS 1130	Fibreglass Wrapping
PSZ 1.1.9	API5L	Specification for Line Pipes of the American Petroleum Institute.
PSZ 1.1.10	SABS 719	Electric welded low carbon steel pipes for aqueous fluids.

PSZ 2. REQUIREMENTS THAT MUST BE SPECIFIED WHEN ORDERING THE PIPES FOR THIS CONTRACT

PSZ 2.1.1 The pipe grade shall be API 5L X52, or equivalent approved alternative.

PSZ 2.1.2 The standard pipe length of 12.192 m shall be used.

PSZ 2.1.3 The pipe sizes are as follows:

Length (m)	Pipe ND (mm)	Pipe ID (mm)		Pipe OD (mm)
680	1 100	1 094		1 118
100	1 000	996		1 016
220	400	394		406

An allowance for variation of the final quantity of plus or minus 5 % shall be provided.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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PSZ 2.1.4 The nominal wall thickness of the pipes shall be:

Pipe ND (mm)	Wall thickness (mm)
1 100	12
1 000	12
400	6

PSZ 2.1.5 The 406mm OD pipes shall be flanged. All other pipe ends shall be plain ended on both sides and the corrosion protection shall be cut back as follows:

- External coating: 100 mm from the end
- Internal lining: 100 mm from the end

PSZ 2.1.6 The following lining and coating as shall be applicable for this contract:

- Internal lining: Hot applied Solvent Free Epoxy lining with a thickness of 600 microns. See more details in Section Y.
- External coating: Rigid Polyurethane applied in a single coating operation to a thickness of 1.7 mm, as detailed in Section Y.

PSZ 2.1.7 The following additional markings shall be applicable for this contract :

The words "Johannesburg Water" and the mass in kg shall be painted on the outside of each pipe.

PSZ 3. REQUIREMENTS TO BE AGREED BETWEEN THE ENGINEER AND THE CONTRACTOR

PSZ 3.1 The following agreements must be reached and confirmed in writing:

PSZ 3.1.1 The wall thickness and/or tolerance, if other than as specified (see PSZ 6.1.3).

PSZ 3.1.2 The hydraulic test pressure, if other than as specified (see PSZ 6.2.5).

PSZ 3.1.3 When relevant, the type of coating or lining or both (see PSZ 6.2.6).

PSZ 3.1.4 The length tolerance when exact lengths are ordered.

PSZ 3.1.5 The delivery schedules.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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PSZ 4. DEFINITIONS

PSZ 4.1 The definitions given in SABS 044 pt 1 shall apply, with the following additions:

Acceptable : Meeting all of the requirements of this specification.

Defective : Failing in one or more respects to meet the requirements of this specification.

Exact length : A length and tolerance as agreed.

Lot : A lot shall consist of 200 pipes or part thereof, of the same grade and nominal size, from one manufacturer, submitted at any one time for inspection and testing.

Nominal size : The nominal bore.

Random length : A normal manufacturing length that is within a limited percentage of the average length required.

Standard length : A pipe length of 6.096, 9.144, 12.192 or 18.288 metres with a tolerance of – 0 mm + 50 mm.

PSZ 5. MATERIAL

PSZ 5.1 Steel plate and strip :

PSZ 5.1.1 The steel strip used for the manufacture of the pipes shall have been produced by the electric furnace, basic open hearth or basic oxygen process, shall be fully killed, fine grained and shall be free from seams, cracks, laminations and other injurious defects.

PSZ 5.2 Chemical composition :

PSZ 5.2.1 The ladle analysis of steel used to manufacture pipes under this specification shall comply with the requirements of the relevant plate grade.

PSZ 5.3 Mechanical properties :

PSZ 5.3.1 The mechanical properties of the steel shall comply with the requirements appropriate to the grade of steel specified.

PSZ 5.4 Heat treatment :

PSZ 5.4.1 The weld seam and the entire heat affected zone shall be subjected to a normalising heat treatment.

PSZ 6. GENERAL REQUIREMENTS

PSZ 6.1 **Dimensional requirements** :

PSZ 6.1.1 Length :

The pipes shall be of random length, standard length or exact length, as required by the Engineer and as specified in PSZ 2.

Random lengths shall be between 6m and 18.5m. Not more than 10% of random lengths, per contract item, shall be shorter than 75% of the average length specified by the Engineer and no pipe shall be shorter than 40% of the average length.

Standard lengths shall be 6.096m, 9.144m, 12.192m or 18.288 metres and shall have a tolerance of – 0 mm + 50 mm.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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PSZ 6.1.2 Nominal size and outside diameter :

The nominal size and outside diameter of a pipe shall conform to the values given in columns 1 and 2, respectively, of Table 2 and as specified in PSZ 2.

The actual outside diameter, when determined in accordance with PSZ 10.1.1 (a) or 10.1.1 (b), as relevant, shall not differ from the specified value by more than the following tolerances:

- (i) Over the appropriate length (measured from each end of the pipe) given in column 3 or 5, as relevant, of Table 3A the corresponding tolerance given in column 2 or 4 of that table.
- (ii) Over the rest of the pipe the appropriate tolerance given in Table 3B.
- (iii) Any out-of-roundness in the body of the pipe shall not exceed $\pm 1\%$ of the nominal outside diameter.

PSZ 6.1.3 Nominal wall thickness :

Unless otherwise agreed upon between the Contractor and the Engineer the nominal wall thickness of a pipe shall, subject to a tolerance of $-1.75\% + 10\%$, be one of the relevant values given in columns 3 to 6 of Table 2.

The wall thickness shall not cause the diameter-wall thickness ratio to exceed 100:1.

PSZ 6.1.4 Straightness :

Any deviation from straight, determined in accordance with 10.1.1 (c) shall not exceed 0.2 % of the length of the pipe. (2 mm per metre of length).

PSZ 6.1.5 Pipe ends ;

Pipes with 550 mm ND and smaller shall be flanged both ends. Flanges shall be in accordance with SANS 1123.

Pipes with nominal diameter of 600mm and larger shall be plain ended (refer to Drawing JW13572 – DET09).

Pipe ends shall be clean cut, free from burrs and shall not deviate from squareness to the axis of the pipe by more than 1.5 mm.

Pipes with wall thicknesses of 4.5 mm or less shall have square cut ends.

Pipes with wall thicknesses greater than 4.5 mm shall be bevelled for field welding unless otherwise specified.

Ends prepared for field welding shall be bevelled to an angle of $30^\circ - 0^\circ + 5^\circ$ and shall have a root face of 1.5 mm - 0.5 mm + 1.0.

PSZ 6.1.6 Trueness and finish of pipes :

All pipes shall be truly cylindrical, shall be free from injurious surface defects, laminations and dents, and any pipe that has flattened areas in the steel wall will be rejected. Helical forming of strip at the beginning and end of coils and across butt-weld joining coils shall be accurate and true. Flat areas, re-entrants, bamboo effects or dents etc., will not be accepted. Special precautions shall be taken to avoid lack of trueness resulting from variations in width of steel strip. All weld spatter shall be removed by chipping or grinding.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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PSZ 6.1.7 Fabrication requirements :

General:

The pipes shall be manufactured exclusively at the Works of the Contractor or by such makers as may be approved by the Engineer and at only one Works unless otherwise agreed to by the Engineer in writing.

The method of manufacture of the pipes shall be detailed. All welding procedures shall be described and approved by the Engineer and all welders and welding operators employed on the Works shall have passed an approved qualification test. The Contractor shall maintain a record of the procedure, performance and qualification tests.

Full details of welding electrodes and fluxes, where applicable, shall be given.

Welding :

All welding shall be electric fusion welding for pipes with outside diameter ranging from 219mm to 508mm and submerged arc spiral welding for pipes with outside diameter ranging from 508mm to 813mm and shall be acceptable to the Engineer.

TABLE 2 - STANDARD NOMINAL SIZES, OUTSIDE DIAMETERS AND WALL THICKNESSES OF PIPES

Nominal size, mm	Outside diameter, mm	Nominal wall thickness, mm			
200	219.1	4.5	6.0	8.0	9.5
250	273.1				
300	323.9				
350	355.6				
400	406.4				
450	457				
500	508				
600	610				
700	711				
800	813				

Other wall thicknesses are subject to agreement between the Contractor and the Engineer.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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TABLE 3A - TOLERANCES ON O.D. OF PIPE ENDS

Nominal size, mm	Pipes to be joined by field welding		Pipes to be joined by couplings	
	Tolerance, mm	Length of ends subject to tolerance, mm	Tolerance, mm	Length of ends subject to tolerance, mm
200 & 250	-1.0 +1.5	100	-1.0 +1.5	100
>250 □ 450	-1.0 +2.5	100	±1.5	150
>450 □ 800	-1.0 +2.5	100	±1.5	150

TABLE 3B - TOLERANCES ON O.D. OF BODY OF PIPES

Specified outside diameter, D, mm	Tolerance, mm
219.1	± 2.0
> 219.1 < _ 355.6	± 2.5
> 355.6	± 3.0

PSZ 6.2

Fabrication:

PSZ 6.2.1

Misalignment:

Any misalignment or offset of plate edges shall be limited to 1.5 mm

PSZ 6.2.2

Welds;

The weld area on the outer surface shall be trimmed to an essentially flush condition, except as allowed for in PSZ 6.2.1. There shall be no visible evidence of lack of fusion throughout the entire weld length.

The height of upset metal and flash on the inner surface shall not exceed 1.5 mm. Any surface indentations resulting from the removal of excess material shall not cause the wall thickness to be reduced by more than 8% of the specified wall thickness.

The weld area and the parent metal shall be free from cracks.

Test specimens, prepared and tested in accordance with PSZ 10.3.1 shall have an ultimate tensile strength at least equal to the minimum specified for the appropriate parent plate.

Test specimens, prepared and tested in accordance with PSZ 10.3.2, shall show no evidence of opening, cracks, laminations or burnt metal in either the weld or the parent metal.

PSZ 6.2.3

Dents:

A pipe shall contain no dents greater than 6 mm, measured as the gap between the lowest point of the dent and a straight edge placed along the pipe surface, above the dent.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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The length of the dent in any direction shall not exceed one-half of the diameter of the pipe.

Any sharp gouge within a dent shall be considered a defect.

PSZ 6.2.4 Rectification of defects:

Surface defects in the parent metal that have not or will not cause leaks may be repaired by welding, provided that the welds comply with the requirements of PSZ 6.2.2.

Repair to defects in the weld zone is not permitted. The weld zone is defined, for this purpose, as being 15 mm on each side of the fusion line.

PSZ 6.2.5 Resistance to hydraulic pressure:

When tested in accordance with PSZ 10.4, pipes shall be capable of withstanding, without weeping, leaking or bursting, the hydraulic test pressure, "P".

The test pressure shall be calculated from the following formula, based upon 75% of the minimum specified yield strength of the steel, with a maximum of 200 Bar.

$$P = \frac{20 \times Y \times 0.75 \times T}{D}$$

Where P = hydraulic test pressure, Bar

Y = minimum specified yield stress of steel plate or strip, MPa.

T = nominal wall thickness of pipe, mm

D = nominal outside diameter of pipe, mm

PSZ 6.2.6 Coatings and Linings

When so required by the Engineer, the pipes shall have been cleaned and coated and/or lined in accordance with the relevant requirements of, SABS 1178 and AWWA C205-89 or as agreed upon between the Engineer and the Contractor. In the case of this contract, refer also to Section Y.

PSZ 7. TRACEABILITY

PSZ 7.1 As soon as possible during or immediately after manufacture, each pipe shall be indelibly marked, approximately 150 mm from one end, with a unique pipe number giving traceability, to the steel used and all inspections and tests performed.

PSZ 7.2 Where die stamps are used they shall be blunted or round nosed in design.

PSZ 8. MARKING

PSZ 8.1 Pipes manufactured to this specification shall be marked as follows :

PSZ 8.1.1 The manufacturer's logo, the specification and grade, month & year of final inspection, diameter, wall thickness, measured length and unique pipe number.

PSZ 8.1.2 For example a 457 x 9.5 grade D320 pipe, 12.199 metres long, released for dispatch during June 97 and manufactured by Bills company, with a pipe number of 970543, would be marked.

B_{co} HL006-D320 6-97 457 9.5 12.199 970543

PSZ 8.1.3 The Engineer's requested data (if any) and the Contractors data shall follow.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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PSZ 8.1.4 Pipe marking shall be carried out using paint/ink stencils. The colour shall be in contrast to the steel or coating colour. At the Contractors choice a black rectangular background may be applied prior to the paint marking. All marking paint used shall be weather proof and shall be compatible with any pipe coating that may be in place.

PSZ 9. SAMPLING AND COMPLIANCE TO SPECIFICATION

PSZ 9.1 Sampling :

PSZ 9.1.1 After each pipe has been inspected and tested as described in PSZ 10.1, 10.2 and 10.4, the following sampling procedure shall be applied in determining whether a lot complies with the appropriate requirements of the specification.

First sample: From an end of one pipe taken at random from the lot cut a section long enough to provide the appropriate test specimens required in terms of PSZ 10.3.

Second sample: If a test specimen from the first sample fails to comply with the appropriate requirements, cut a section, long enough to provide the specimen for each test that the first sample failed, from each of two further pipes taken at random from the lot.

Third sample: If a test specimen from the second sample fails to comply with the appropriate requirements, cut a similar section from each pipe in the lot or each of 10 further pipes taken at random from the lot, whichever is less.

PSZ 9.2 Compliance:

PSZ 9.2.1 The lot shall be deemed to comply with the requirements of the specification if:

After inspection and testing of the lot in terms of PSZ 10.1, 10.2 and 10.4 no defect is found and;

After testing of the first sample no defect is found or;

After testing of the second sample no defect is found or; and

After testing of the third sample no defect is found.

PSZ 10. INSPECTION AND TESTING

PSZ 10.1 Dimensions:

PSZ 10.1.1 Using any method that will provide the required accuracy, measure the dimensions of each pipe in the lot for compliance with PSZ 6.1. When measuring outside diameter and straightness, follow the following rules:

Pipe ends - use a ring gauge machined to the greater dimension given in columns 2 or 4 of table 3A to check the pipe ends. (Relative to the size and jointing system specified).

Pipe body - use a diameter tape or calliper to check the body.

Straightness - measure any gap between the pipe surface and a taught wire stretched over the full length of the pipe and clamped at pipe ends on spacers of equal thickness. The gap measured after deducting the spacer thickness shall not deviate from the requirements of PSZ 6.1.4 (a).

PSZ 10.2 Welds :

PSZ 10.2.1 Visually examine the weld zone and the surrounding parent metal of each pipe for compliance with the requirements of PSZ 6.2.2 and, when relevant, PSZ 6.2.4.

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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PSZ 10.3 Destructive Tests :

PSZ 10.3.1 Transverse tensile test :

From a cold-flattened section of pipe, from each lot, cut a transverse test specimen conforming to the sketch at table 3 of SABS 054, with the weld across the centre. Dimension b shall be 38 mm, lc = 58 mm and r = 25 mm. Determine the ultimate tensile strength (UTS) by the method given in SABS 054. Refer to API 5L Grade B for compliance.

PSZ 10.3.2 Flattening tests :

Cut two cylindrical test specimens approximately 100 mm wide from each lot produced. Flatten the specimens between two parallel flat surfaces, one with the weld at 0° to the direction of load the other with the weld at 90° to the direction of load, until the outside diameter to which the compression is applied is reduced to two-thirds of its original value. The flattened specimens shall comply with PSZ 6.2.2 (e).

PSZ 10.4 Hydraulic tests :

PSZ 10.4.1 Subject each pipe in the lot to the relevant hydraulic test pressure specified in PSZ 6.2.5. Maintain the pressure for the length of time necessary to inspect the welds for leaks and to check for compliance with the requirements of PSZ 6.2.5.

PSZ 10.5 Coatings and linings :

PSZ 10.5.1 When applicable, inspect and test the coatings and linings of the pipes for compliance with the requirements of PSZ 6.2.6. In the case of this contract, refer also to Section X and Section Y.

PSZ 11. CERTIFICATION

PSZ 11.1 A mill certificate in accordance with DIN 50049 3.1.b shall be issued by the pipe manufacturer for each consignment of pipes manufactured in accordance with this specification.

PSZ 11.2 3.1.b certificates shall show the actual chemical and mechanical properties of each heat of steel used, the corresponding unique pipe numbers made from each heat and shall demonstrate that all required inspections and tests were carried out with acceptable results.

PSZ 11.3 Every 3.1.b mill certificate shall bear the date of the final acceptance inspection of its relative consignment and shall be valid for a period of 30 days from that date.

PSZ 11.4 Companies wishing to update the validation of a certificate may do so through contact with the pipe manufacturer or through the intervention of an independent third party inspectorate.

PSZ 12. DELIVERY OF COATED PIPES

PSZ 12.1 The Contractor is responsible for coating the pipes and he shall make all arrangements for transporting the pipes from the place of coating to the site.

PSZ 12.2 The Contractor will be required to deliver coated pipes from the place of manufacture to the proposed pipeline route on site as and when directed by the Engineer, or to suit the production rate for installation of pipes on site.

PSZ 13. STORAGE OF PIPES AT PLACE OF MANUFACTURE

PSZ 13.1 All pipes that have been coated shall be stored at the place of coating until they can be accepted at the pipeline route. The pipes shall be placed on approved supports in a demarcated area which has been cleared of all vegetation and treated with an effective weed

Employer:		Contractor	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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killer. The supports shall be arranged so that the bearing area is adequate to prevent damage to the external coating.

PSZ 13.2 Each bitumen coated pipe shall be coated with lime wash to reduce the effect of solar heat on the coatings for the duration of the storage period. Each pipe end shall be enclosed with a white polyethylene sheet cover secured to the pipe by a metal strap. The cover shall be perforated to allow the flow of a small quantity of air through the pipe.

PSZ 13.3 During inclement weather or for any other reason that may prevent acceptance of pipe deliveries at the site the Engineer may instruct that pipes be stored at the place of coating.

PSZ 14. PROTECTION OF PIPES DURING TRANSPORTING

The coated pipes at all stages during its transportation to the site of delivery shall be protected against damage. The pipe shall be lifted by means of broadband slings and the use of chains, wire ropes, etc. will not be permitted. Wooden chock blocks, at least 150 mm wide, suitably padded for the pipes to rest on, shall be provided on each transport vehicle. Should the Tenderer consider that the ends of the pipe require special protection; his proposals in this connection shall be stated at the time of tendering. The cost of such protection shall be included in the tendered rates.

PSZ 15. REPAIR OF DAMAGED PIPE SHELLS AND COATED PIPES

The Contractor shall repair at his own cost and expense all damage to a pipe and/or its internal and external coating that may occur to the pipe up to the time of installation.

Employer:		Contractor	
Witness:		Witness:	

Johannesburg Water (SOC) Ltd



CONTRACT NO: JW14301R

LINBRO WATER UPGRADE

VOLUME 2

PART 4: SITE INFORMATION



Employer:		Contractor	
Witness:		Witness:	



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Employer:		Contractor	
Witness:		Witness:	



C4 SITE INFORMATION

C4.1 GENERAL

This section describes the site at the time of tender to enable the tenderer to price his tender and to decide upon his method of working and programming and risks.

C4.2 SITE LOCATION

The site is situated in Linbro Park, Johannesburg. The proposed pipe-route will run alongside Clifford Road (a portion of which has been abandoned) and through the property of UTi, a private landowner. The proposed pipe-route then crosses Clulee Road and enters the Linbro Park/ Alexandra Reservoir Complex (LPARC). Refer to the locality plan included in the set of drawings.

C4.3 ACCESS TO SITE AND RESTRICTIONS

Any permission as may become necessary shall be the responsibility of the Contractor to obtain.

Having been granted access to works areas by the Employer, other service authorities and private owners, the Contractor shall adhere to any agreed conditions of access and ensure the works area is left in a condition similar to when it was first accessed. It must be kept in mind that part of the site is located within a private business development and care must be taken not to compromise the safety/ security of the workers or property of the development or those of adjacent developments / properties.

C4.4 EXISTING SERVICES, SERVITUDES AND WAYLEAVES

For detailed specification the Contractor shall refer to clauses PS1.5 (Temporary Works), PS4.5 (Existing services), and PS4.8 (Permits and wayleaves). Wayleaves obtained to date are attached at the end of Section C4 : Annexure To Specifications

C4.5 SECURITY

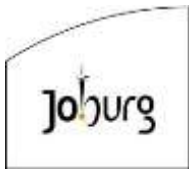
The Contractor shall be responsible for the security of his personnel, materials, equipment and construction plant on and around the site of the Works and for the security of his camp (if applicable). The Employer in this regard will consider no claims.

Refer to clause PS6.1 (Security)

C4.6 NATURE OF GROUND AND SUBSOIL CONDITIONS

It shall be the Contractor's responsibility to acquaint himself with the conditions of the site. A geotechnical study has been done and is available upon request.

Employer:		Contractor	
Witness:		Witness:	



C4.7 GEOTECHNICAL REPORT AND BOREHOLE CORES

A geotechnical report is available on request. It shall be the Contractor's responsibility to acquaint himself with the conditions of the site when submitting his or her rates.

C4.8 HYDROLOGICAL REPORT AND FLOODLINES

There are no supporting documents available with regard hydrological and floodline aspects.

Employer:		Contractor	
Witness:		Witness:	

	OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION	
	PROJECT NUMBER:	JW 14301R
	PROJECT LOCATION:	LINBRO PARK
	PROJECT DESCR:	LINBRO WATER UPGRADE

VOLUME 3

Occupational Health & Safety Specification

JW 14301R

LINBRO WATER UPGRADE

Prepared by: OHS Department PO Box 61542 Marshalltown 2107 Tel: +27 11 688 1476	PRINCIPAL CONTRACTOR:	
	CEO (16.1 APPOINTEE):	
	TELEPHONE NUMBER:	
	FAX NUMBER	
	E-MAIL ADDRESS:	
	SIGNATURE:	

	OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION	
	PROJECT NUMBER:	JW 14301R
	PROJECT LOCATION:	LINBRO PARK
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General Notification

This document forms an integral part of the Contract Specification and, in particular, shall constitute the Client's (Johannesburg Water SOC Ltd.) Occupational Health & Safety (OHS) Specification, as required by the Construction Regulations, 2014, as promulgated under the Occupational Health and Safety Act (Act no. 85 of 1993). The Specification shall furthermore be applied for the management of Mandatories performing activities for or on behalf of Johannesburg Water SOC Ltd, irrespective whether the contract work constitutes construction work or not.

The Contract Specification is contained in Volume 1 of the contract documents in Part 3: Scope of Work.

Acknowledgements

This Occupational Health & Safety (OHS) Specification was developed by the internal OHS Department for the sole use by Johannesburg Water SOC Ltd. The issue date of this OHS Specification is September 2016.

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ABBREVIATIONS

Abbreviation	Description
CR	Construction Regulations
COID	Compensation for Occupational Injuries and Diseases
DoL	Department of Labour
GAR	General Administrative Regulations
GMR	General Machinery Regulations
GSR	General Safety Regulations
HCS	Hazardous Chemical Substances
HIRA	Hazard Identification and Risk Assessment
JW	Johannesburg Water (SOC) Ltd
SDS	Safety Data Sheet
OHS	Occupational Health and Safety
PPE	Personal Protective Equipment
PER	Pressure Equipment Regulations
SANS	South African National Standards
SABS	South African Bureau Standard
SOC	State Owned Company

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DEFINITIONS

Word / Phrase	Definition
“WCL 1”, “WCL 2” and “WCL 22”	Means the prescribed forms for reporting of incidents and occupational diseases referred to in the Compensation for Occupational Injuries and Diseases Act.
Competent Person	A person who has in respect of the work or task to be performed the required knowledge, training, experience and, where applicable, qualifications specific to that work or task: provided that where appropriate, qualifications and training are registered in terms of the provisions of the National Qualification Framework Act, 2000 (Act 67 of 2000).
Construction work	Any work in connection with: a) The construction, erection, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure b) the construction, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system or any similar civil engineering structure; or the moving of earth, clearing of land, the making of an excavation, piling, or any similar type of work
Contractor (inclusive of Principal Contractor)	Any organization, person, entity performing activities for or on behalf of Johannesburg Water SOC Ltd.
Corrective Action	Action to eliminate the cause of a detected nonconformity or other undesirable situation.
Employee	Any person who is employed by or works for an employer and who receives or is entitled to receive any remuneration or who works under the direction or supervision of an employer or any other person
Employer	Any person who employs or provides work for any person and remunerates that person or expressly or tacitly undertakes to remunerate him, but excludes a labour broker as defined in section I (1) of the Labour Relations Act, 1956 (Act No. 28 of 1956)
Hazard	Means a source of or exposure to danger.
Hazard identification	The identification and documenting of existing or expected hazards to the health and safety of persons, which are normally associated with the type of construction work being executed or to be executed.
Incident	Means an incident as contemplated in section 24 (1) of the OHS Act 85 of 1993.
Machinery	means any article or combination of articles assembled, arranged or connected and which is used or intended to be used for converting any form of energy to performing work, or which is used or intended to be used, whether incidental thereto or not, for developing, receiving, storing, containing, confining, transforming, transmitting, transferring or controlling any form of energy
Mandatory	Includes an agent, a contractor or a subcontractor for work, but without derogating from his status in his own right as an employer or a user
Medical surveillance	Means a planned programme or periodic examination (which may include clinical examinations, biological monitoring or medical tests) of employees by an occupational health practitioner or, in prescribed cases, by an occupational medicine practitioner.
Method Statement	A document detailing the key activities to be performed in order to reduce as reasonably as practicable the hazards identified in any risk assessment.
Principal Contractor	Any employer who performs work and is appointed by the Client to be in overall control and management of the contract work (inclusive of Mandatories).
SHE File	A file or other record in permanent form, containing the information required as contemplated in the S.H.E Specification Document and legal requirements applicable to work activities.
SHE Plan	A documented plan which seeks to address all hazards identified means and ways to control and eliminate such to ensure compliance to the S.H.E Specification.
Workplace	Any physical location in which work related activities are performed under the control of the organization.

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1. Introduction

In terms of Section 37 of the Occupational Health and Safety Act (Act no. 85 of 1993), Johannesburg Water SOC Ltd is required to control persons/organizations conducting activities for or on their behalf (Mandatories) and the Construction Regulations promulgated under the Occupational Health and Safety Act (Act no. 85 of 1993), is requiring Johannesburg Water SOC) Ltd. to compile an occupational health and safety specification for any intended project classified as construction work and to provide the specification to prospective tenderers / Mandatories.

The dual objective of this specification is to ensure that the Mandatories and Principal Contractors (herein after called Principal Contractor (including Mandatories)) entering into a contractual agreement/relationship with Johannesburg Water SOC Ltd. achieves and maintains an acceptable level of occupational health, safety and environmental performance whilst conducting activities to perform the contract work.

This document forms an integral part of the Contract Specification and, in particular, shall be the OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION FOR CONSTRUCTION WORK. The Contract Specification is contained in Volume 1 of the contract documents. The principal and other contractors shall ensure that this specification is included with any contract/s that they may have with other contractors and/or suppliers that are engaged for the provision of labour, goods or services for this project. The Principal Contractor and its Contractors shall furthermore implement any reasonable practicable means to ensure compliance to this Occupational Health & Safety (OHS) Specification and any other applicable legislation on their organization and/or activities performed by or for them. This OHS Specification will be read in conjunction, where issued and applicable, with the Environmental Specification issued for listed activities requiring environmental authorization by a relevant authority.

Compliance with this OHS specification does not absolve the Principal Contractor from complying with any other applicable minimum legal requirement and the Principal Contractor remains responsible for the sustainable integrity of the environment and the health and safety of its employees, mandatories as well as any persons affected by activities conducted for or on behalf of Johannesburg Water SOC Ltd (SOC) Ltd..

1.1 Johannesburg Water SOC Ltd's commitment to Occupational Health, Safety & Environmental (SHE) Management

Johannesburg Water SOC Ltd is committed to responsible occupational health, safety and environmental management. This commitment is essential to protect the environment, employees, Mandatories, visitors and provide a work environment conducive to health and safety. Principal Contractors and their Contractors shall demonstrate their commitment and concern by:

- Ensuring that decisions and practices affecting occupational health, safety and environmental performance are consistent with the issued SHE specification;
- Ensuring adequate resources are made available for the effective implementation of occupational health, safety and environmental control and mitigation measures;
- Participating in hazard identification and risk assessments and design safety reviews;
- Communicating occupational health, safety and environmental management processes, strategies and control measures with all levels of employees, contractor and/or visitors;
- Ensuring visible leadership at all sites;
- Promoting and enforcing the use of correct types of Personal Protective Equipment (PPE);
- Reporting and investigation of incidents and accidents and ensuring actions are identified and implemented to prevent similar types of incidents reoccurring;
- Participating in Client audits and meetings and ensuring required actions are implemented within reasonable time frames on the site/project;
- Recognizing and commending safe work practices and coaching employees who require guidance;
- Applying and enforcing consequence management from deviations and transgressions off/from compliance to this SHE Specification noted and/or observed, where applicable;
- Carrying out safety observations, implement corrective and preventative actions and giving immediate feedback;

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- Encouraging employee participation in the formulation of work instructions and safety rules.

1.2 Scope of Occupational Health, Safety and Environmental (SHE) Specification

The scope of this Occupational Health, Safety and Environmental (SHE) Specification is to address the reasonable and foreseeable aspects of occupational health, safety and environmental management, which will be affected by the contract work.

The specification will provide the requirements that the Principal Contractor and other Contractors shall comply with in order to reduce the risks associated with the contract work, and that may lead to incidents causing injury and/or ill health or degradation of the environment, to a level as low as reasonably practicable and possible.

In particular, Johannesburg Water SOC Ltd will ensure that it shall not appoint any Principal Contractor unless it is reasonably satisfied that the contractor which it intends to appoint has the necessary competencies and resources to carry out the work safely.

1.3 Omissions from SHE Specification

Where any omission from the SHE Specification is identified, applicable legal requirements will constitute the minimum standard for compliance to the relevant omission. The responsibility will be on the Principal Contractor to provide assurance to Johannesburg Water SOC Ltd on compliance to the applicable legal requirements related to the activity / task / process.

1.4 Change management

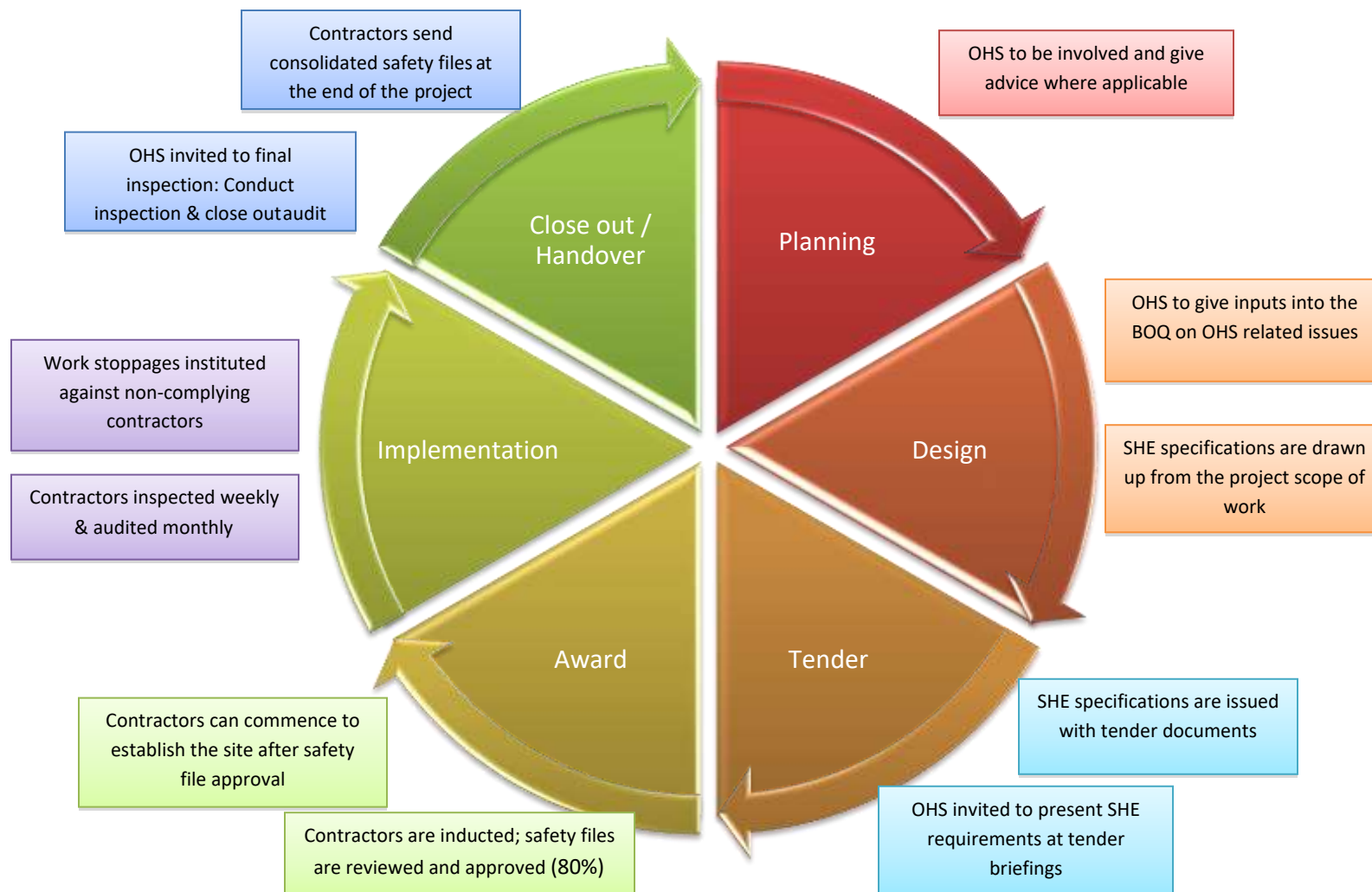
Whenever Johannesburg Water SOC Ltd identifies the need to change or review the SHE Specification, approved changes and revisions will be communicated to the Principal Contractor. A cost analysis on the implementation of the proposed changes / revisions will be calculated through a collaborative processes between Johannesburg Water SOC Ltd and the Principal Contractor – where the approved changes and/or revisions has no cost implication for the Principal Contractor the Principal Contractor will be required to accept the approved changes / revisions and ensure implementation within the SHE Plan / File framework.

2 Overview of contractor management process

The contractor management process consists of the following phases:

- Tender briefing and tender documentation;
- Competency evaluation of Principal Contractors (integrated into Supply Chain Management processes);
- Appointed contractor to attend SHE system induction;
- Preparation of SHE File by Principal Contractor;
- Evaluation of SHE File;
- Principal Contractor engagement phase;
- Project close-out and submission of consolidated Health & Safety File.

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2. SHE DOCUMENTATION

2.1 Safety file

The Principal Contractor will prepare a SHE File containing the processes / procedures and templates to be applied during the project period for the scope of work. The Principal Contractor will be evaluated during the contract period against the submitted SHE File.

At a minimum the SHE File will contain the following documentation:

- Notification of construction work to the relevant Department of Labour (stamped on each page)
- Scope of work to be performed;
- Personnel list (Principal Contractor employees);
- OH&S / SHE Policy and other Policies;
- Updated copy of the Occupational Health and Safety Act (Act no. 85 of 1993) and its Regulations; COIDA Act.
- Proof of valid registration and good standing with the Compensation Commissioner or another licensed Insurer;
- SHE Plan agreed with Johannesburg Water SOC Ltd.
- Approved risk assessments, review and monitoring plans and safe work procedures (method statements);
- A list of contractors (sub-contractors) including copies of the agreements between the parties and the type of work being done by each contractor;
- All written designations and appointments for project scope of work (CV and competency copies);
- Management structure (inclusive of OH&S responsibility & meeting structure);
- Induction training and site SHE rules;
- Occupational health and safety training matrix / plan;
- Arrangements with contractors and/or mandatories;
- Description of security measures;
- The following registers (as applicable to contract scope of work):
 - Accident and/or incident notifications, investigation & control register;
 - Occupational health and safety representatives inspection register;
 - Template for entry into confined space;
 - Toolbox talks pro-forma;
 - Fall protection inspections template;
 - First-aid box content template;
 - Record of first-aid treatment template;
 - Fire equipment inspection and maintenance template;
 - Ladder inspection template;
 - Machine safety inspections template (including machine guards, lock-outs etcetera);
 - Inspection templates for lifting machines and –tackle (including daily inspections by drivers/operators);
 - Inspection templates of scaffolding;
 - Inspections templates of structures;
 - Templates of issuing of Personal Protective Equipment;
 - Monthly reporting and recording of statistics templates;
 - Keeping of any other record in terms of applicable legislation falling within the scope of SHE Legislation applicable to the project and the Principal Contractor / Contractor's activities and organization.
- Emergency preparedness and response programmes;
- Medical examination tests

2.2 Principal contractor appointment

- The principal contractor will be appointed in terms of Construction Regulations 2014, Reg 5(1) k
- All responsibilities imposed on the contractor by the Regulations will be applicable
- The duties will include:
 - a) Prepare a site specific SHE file based on client SHE specification and project scope.

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- b) Have an updated Letter of Good standing.
- c) Ensure the necessary legal appointment letters are compiled and signed by affected parties.
- d) Ensure SHE file submitted before work commences to Johannesburg Water for evaluation and approval.
- e) Must ensure an organizational medical programme for its employees is in place. This must address pre-employment, periodic examination, and exit examinations.
- f) Ensure all employees undergo medical examination and are declared fit for the job they are employed for by a Medical Practitioner.
- g) All employees undergo his control undergo company specific induction and Johannesburg water induction.
- h) Ensure before work commences employees are trained on the health and safety risks associated with the work they are conducting.
- i) Ensure employees are trained on company procedures, policies, method statements and informed of the Johannesburg Water SHE requirements as per the specification.
- j) Ensure legislative requirements are complied with during the duration of the contract and ensure that their employees comply also.
- k) Sign the 37 (2) Agreement between Johannesburg Water and themselves before any work commences and kept on their SHE file.
- l) Ensure that 37(2) Agreement(s) are signed between themselves and their sub-contractors.
- m) Ensure that sub-contractors have valid Compensation Commissioner Letter of Good Standing.
- n) Have a disciplinary procedure to address those found to be transgressing requirements of SHE specification, SHE plan, site rules or any other OHS act and its Regulation requirement.
- o) Prevent any employee or visitor who is under the influence of any alcohol or drugs (in state of intoxication) from being allowed to site.
- p) Ensure the safety of employees who are taking legal medication.
- q) Must hand over a consolidated SHE file at the end of the contract.
- r) Stop his/her employees who are doing unsafe acts or who are creating an unsafe environment.
- s) Investigate all incidents and report to Johannesburg water and ensure all reportable incidents as per the legislative requirement are complied with.
- t) Ensure work is supervised by competent personnel and that work is done by competent employees.
- u) Ensure pre-task risk assessment is done by a competent person and that employees are informed of the pre-task risks and the risk control measures.
- v) Ensure tool box talks are conducted to communicate SHE issues in connection to the work being done and any other aspects.
- w) Ensure that appointed personnel as per the SHE file are executing their duties as per the legal appointment.
- x) Ensure first aid kit is made available in case of any emergency.
- y) Ensure that housekeeping is maintained in good condition and that materials are store/stacked properly in designated areas.
- z) Have sufficient waste receptacles and ensure the correct disposal of the different wastes.
- aa) Proof of hazardous waste disposal to be requested from disposal site and to be kept inside SHE file.
- bb) Take reasonable steps to ensure that each appointed sub-contractor health and safety plan is implemented and maintained on the site and SHE File documentation is up to date.
- cc) Stop any work from being executed which is not in accordance with the client's health and safety specification and the principal contractor's health and safety plan for the site or which poses a threat to the health and safety of persons.
- dd) Must maintain an up to date list of all the sub-contractors on site accountable to the principal contractor, the agreements between the parties and the type of work being done; and
- ee) Ensure that all his or her employees have a valid medical certificate of fitness.

2.3 37.2 Agreement

- Johannesburg Water will enter into a 37(2) Agreement with all the appointed contractors
- A copy of the 37(2) Agreement must be kept in the SHE file of the contractor at all times.
- It is the responsibility of the contractor to ensure that there are 37(2) agreements between themselves and all their appointed sub-contractors.

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2.4 SHE Plan

- The contractor shall prepare a SHE plan to address and manage all applicable sources of risk that are identified during the execution of the project. The SHE plan shall incorporate the requirements as listed in the SHE specification.
- A copy of the SHE plan shall be submitted together with SHE file for review and approval.
- It is the contractor responsibility to ensure they sub-contractor compiles a SHE plan that in line with the SHE specification requirement of Johannesburg Water.

2.5 Legislative framework

All contractors shall comply with legislation pertaining to this contract, including but not limited to:

- Constitution of the Republic of South Africa
- Occupational Health and Safety Act and its associated Regulations
- National Environmental Management Framework Legislation
- National Road Traffic Act
- Applicable South African National Standards (SANS)
- Compensation of Occupational Injuries and Diseases Act (COIDA)
- Local by-laws and provincial ordinances

2.6 SHE Policy

A SHE policy is a statement of intent and a commitment by the organization Chief Executive or Managing Director (OHS Act 16(1) appointee) in relation to requirements applicable to their Safety, Health and Environmental legal obligation, relevant SHE roles and responsibilities, and contractual obligations to the Client.

The contractor and their sub-contractor companies shall each have a documented SHE Policy authorized by their Chief Executive/Managing Director (OHS Act Section 16 (1) Appointee). The SHE Policy must meet the following minimum requirements;

- Organizational Mission and Goal.
- State the overall SHE objectives within the project.
- Show commitment to the prevention of injuries and ill-health.
- Show commitment to the protection of environment and the conservation of natural resources.
- Must be reviewed at predetermined intervals, or when there is change in work process, serious incident occurs.
- The SHE Policy must be in line with ISO 45001 and ISO 14001 requirements and guidance documentation.
- Must be authorized by contractor CEO.

2.7 Appointments and competencies

- The contractor and its appointed sub-contractor must make the relevant legislative and non-statutory appointments, which must be maintained valid for the entire contract duration.
- All appointees shall be suitably trained and certified competent for the responsibilities they are assigned for.
- Copies of all relevant appointments and the relevant competence certificates must be kept in the relevant SHE file.

2.8 Supervision of construction work

- The principal contractor shall ensure that the construction manager and construction health and safety officer are appointed for a **single site** on a full time basis.
- Where the total number of employees on site exceeds 75, the contractor shall appoint 2 Safety Officers and an Assistant Construction Manager.
- In the event that the appointed Safety Officer / Construction Manager cannot come to work for more than 5 days, the contractor must ensure that a substitute is appointed until they are back on site.
- JW should be informed in writing of the absence of the above-mentioned on site.

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Appointment index

Appointment	Legislative Ref	Competency requirements (Min)
Alternate Construction Manager	CR 8.1	N.Dip Eng + 4yrs exp
Assistant Construction Manager	CR 8.2	N.Dip Eng + 4yrs exp
Assistant Construction Supervisor	CR 8.8	-
Bulk mixing plant	CR 20	Certificate
Confined Space Supervisor	GSR 5	Certificate + Proven experience
Construction Manager	CR 8.1	N.Dip Eng + 4yrs exp Full time on site
Construction Health , Safety & Environmental Officer	CR 8.5 & JW Requirement	N.Dip Safety + 2yrs exp; OR N.Dip Enviro + 3yrs exp; OR NEBOSH / SAMTRAC + 4yrs exp Full time on site Experience in enviro / certificate Fully registered with SACPCMP as CHSO
Construction supervisor	CR 8.7	3 yrs experience
Construction vehicle & mobile plant supervisor	CR 23.1	Certificate
Electrical installation and appliances inspector	CR 24	
Emergency, security and fire coordinator	CR 29	Certificate
Excavation supervisor (including piling)	CR 13	3yrs exp / N.Dip building
Fall protection supervisor	CR 10.1	Certificate
First-aiders	GSR 3	Certificate
Fire fighting equipment inspector	CR 29	Certificate
General Machinery Supervisor	GMR 2.1/7	GCC (GMR 2.1)/ 3yrs exp (GMR 2.7)
Temporary work supervisor (Formwork)	CR 12.2	N.Dip building + 4yrs exp
Hazardous chemical substances supervisor	HCS Regs	Certificate
Incident investigator	GAR 9.2	Certificate
Ladder inspector	GSR 13A	-
Lifting machines and equipment inspector	DMR 18.5	Certificate + 3yrs experience
Materials hoist inspector	CR 19.8	Certificate
Occupational health and safety committee	OHS Act 19	-
Occupational health and safety representatives	OHS Act 17	Certificate
Risk assessor	CR 9.1	Certificate
Stacking and storage supervisor	CR 28	Certificate
Structures supervisor	CR 11.2	N.Dip building + 4yrs exp
Suspended platform supervisor	CR 17.1	Certificate
Welding supervisor	GSR 9	Certificate

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2.9 Insurances

- The principal contractor and all his appointed contractors shall be registered with an appropriate compensation commissioner and have available a valid letter of good standing at all times.
- The obligation lies with the contractor to ensure that the Letter of Good Standing remains valid throughout the entire duration of the project.
- A copy of the said letter must be filed in all SHE files and made available during inspections and audits.

2.10 Costing for SHE

The contractor is responsible for ensuring that SHE costing is taken into consideration for the entire project/contract as this will ensure they comply with the SHE legislative requirements.

2.11 Sub-contractors

- Whenever the Principal Contractor appoints contractors or sub-contractors, it is a requirement that an Occupational Health and Safety Act (Act no. 85 of 1993) Section 37(2) agreement (i.e. Agreement with Mandatory) is entered into between the Principal Contractor and Contractors.
- The Principal Contractor will ensure that all appointed contractors comply with the Johannesburg Water SOC Ltd SHE Specification requirements.
- The Principal Contractor will establish a procedure on sub-contractor management and assurance on compliance to the established procedure will be provided to Johannesburg Water SOC Ltd on a monthly basis.
- Principal Contractors are required to formally notify Johannesburg Water SOC Ltd before appointing subcontractors.
- Johannesburg Water SOC Ltd shall approve all specialist subcontractors to be appointed and/or engaged by the Principal Contractor.

The Principal Contractor shall:

- Ensure prior to work commencing on the site that every contractor is registered and in good standing with the compensation fund or with a licensed compensation insurer as contemplated in the Compensation for Occupational Injuries and Diseases Act, 1993;
- Appoint each contractor in writing for the part of the project on the construction site;
- Take reasonable steps to ensure that each contractor's health and safety plan is implemented and maintained on the construction site;
- Ensure that the periodic site audits and document verification are conducted at intervals mutually agreed upon between the principal contractor and any contractor, but at least once every 30 days;
- Stop any contractor from executing construction work which is not in accordance with the client's health and safety specifications and the principal contractor's health and safety plan for the site or which poses a threat to the health and safety of persons;
- Include and make available a comprehensive and updated list of all the contractors on site accountable to the principal contractor, the agreements between the parties and the type of work being done; and
- Ensure that all his or her employees have a valid medical certificate of fitness specific to the construction work to be performed and issued by an occupational health practitioner in the form of Annexure 3.

2.12 Notification of construction work

- The Principal Contractor shall, before carrying out any work, notify the relevant Department of Labour of the intention to carry out construction work and use the form (*Annexure 2 in the Construction Regulations 2014*) for this purpose.
- Only a certified copy stamped (each page) by the Department of Labour will be acceptable. No faxed or emailed notifications will be accepted.
- No work shall commence before the Principal Contractor has submitted notification of construction work to the relevant Department of Labour.
- Johannesburg Water SOC Ltd will not approve the OHS File if no original stamped / certified copy of the notification of construction work has been done.

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2.13 Construction work permit

- There might be a requirement for a construction work permit for this depending on the project value at award (>R60M).
- The permit can only be applied for after a contractor has been appointed, and the process will take approximately 30 days or more if requirements are not met.
- The Client will appoint a PrCHSA (Professional Construction Health and Safety Agent) registered with the SACPCMP to oversee the permit application process, and the contractor will be required to provide supporting documents for the application of the permit.

3. ORGANISATIONAL STRUCTURE

- The contractor shall develop and submit together with SHE file an organizational organogram related to the contractor, listing all the levels of responsibility from the Chief Executive down to the supervisor(s) responsible for the project.
- The organogram diagram must list all relevant positions, names of appointees and legal appointments.
- The contractor is responsible for updating the organogram timeously when there are changes to the appointments.
- All appointed sub-contractors are also required to compile their own organograms.

4. COMMITMENT TO SHE

- Visible commitment is essential to providing a safe working environment.
- Managers, supervisors and employees at all levels must demonstrate their commitment by being proactively involved in the day to day SHE operations.
- Legislation requires that each employee takes reasonable care of themselves and their fellow workers

5. HIRA

Annexure 1: List of possible hazards emanating from projects and activities conducted for or on behalf of Johannesburg Water SOC Ltd includes an assessment of site specific health and safety hazards and risks and environmental aspects and impacts that have been identified by Johannesburg Water SOC Ltd as possibly applicable to the contract work for this project. It is by no means exhaustive and is offered as assistance to the tenderers and contractors.

Development of risk assessments

Every Contractor performing construction work shall, before the commencement of any construction work or work associated with the construction work, and during construction work, ensure that a risk assessment is undertaken by a competent person, appointed in writing, and the risk assessment shall form part of the SHE plan to be applied on the site. Risk assessments shall identify occupational health and safety hazards and risks and environmental aspects and impacts emanating from the activity to be performed by the Principal Contractor / Contractor.

The risk assessment (inclusive of impact assessment) shall include (at a minimum):

- Identification of the relevant Johannesburg Water SOC Ltd Project with regard to JW Number, Project name and area;
- Date on which risk assessments were conducted /reviewed;
- The identification of the risks / hazards and aspects / impacts to which persons may be exposed to per activity;
- The analysis and evaluation of the risks / hazards and aspects / impacts identified;
- Existing control measures and proposed corrective measures;
- A plan to review the risk assessments as the work progresses and changes are introduced;
- Identification of significant risks (e.g. high; exceeding 75%);
- A documented plan of Safe Working Procedures (SWP)', and its relevance to the risk assessment, inclusive of method statements, to mitigate, reduce or control the risks and hazards that have been identified;
- A plan to monitor the application of the Safe Working Procedures (SWP);

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- Signature of appointed competent person conducting risk assessment; and
- Signature of approval by Principal Contractor management and employees involved in risk assessment.

Based on the risk assessments, the Principal Contractor must develop a set of site-specific occupational SHE rules that will be applied to regulate the health, safety and environmental hazards/aspects of the construction work.

The risk assessments, together with the site-specific occupational health and safety rules, must be submitted to Johannesburg Water SOC Ltd before mobilisation on site commences. These will be included in the SHE plan. The Contractor shall ensure through his risk management process the hierarchy of controls stipulated as follows, are implemented:

- **Eliminate** - The complete elimination of the hazard.
- **Substitute** - Replacing the material or process with a less hazardous one.
- **Redesign** - Redesign the equipment or work process.
- **Separate** - Isolating the hazard by guarding or enclosing it.
- **Administrate** - Providing control such as training, procedures etc.
- **Personal Protective Equipment (PPE)** - Use of appropriate and properly fitted PPE where other controls are not practical. (PPE as the last resort)

The Principal Contractor will be required to carry out the following three forms of risk assessment:

- Baseline risk assessment;
- Issue based risk assessment;
- Continuous risk assessments.

Baseline risk assessments

The Principal Contractor is required to develop a baseline risk assessment taking the resources, competency levels, nature and scale of their organization into consideration for submission during SHE File evaluation phase. The hazards and risks to which persons, plant, vehicles and facilities may be exposed during the construction should be identified and evaluated. The aspects and impacts resulting in environmental pollution or degradation should also be identified and evaluated. Measures to reduce or control these risks or hazards should be defined during this assessment. The effectiveness of the measures defined and the baseline risk assessment prepared shall be monitored and reviewed from time to time to ensure that it remains relevant and accurate.

Issue based risk assessments

The Contractor will be required to carry out separate risk assessments during construction of the project when methods and procedures are varied, for example when:

- Designs are amended;
- New machines are introduced;
- Plant is periodically cleaned and maintained;
- Plant is started-up or shut-down;
- Systems of work change or operations alter;
- Indents or near-misses occur; or
- Technological developments invalidate prior risk assessments.

Continuous risk assessments

The Occupational Health and Safety Act (Act no. 85 of 1993) specifically requires that employers shall provide and maintain working environments that are safe and without risk to health. The general awareness of hazards needs to be raised as work ethic to maintain a safe and risk free environment on an on-going basis. This is achieved by continuous risk assessments, a form of risk assessment that takes place as an integral part of day-to-day management. Examples of continuous risk assessments include:

- Maintaining general hazard awareness, and
- Pre-work risk assessments / Daily Safety Task Instructions.

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Occupational health and safety risks or environmental impacts that are identified during the risk assessment process shall be communicated before the commencement of the said activity to every employee whose work is associated with the risk. Each employee shall sign to confirm understanding of the safety, health or environmental risks in the tasks.

Review of risk assessments

The Principal Contractor is required to review the hazards identified, the risk assessments and the Safe Work Procedures as the contract work develops and progresses and each time changes are made to the designs, plans and construction methods and/or processes. Revisions to the approved risk assessments and Safe Work Procedures will be presented at each production planning and progress meeting.

Risk assessments are to be reviewed whenever there is change on the scope of work, process, and accidents or when required by Johannesburg Water SOC Ltd

The Principal Contractor must provide Johannesburg Water SOC Ltd, other contractors and all other concerned or affected parties with copies of any changes, alterations or amendments to risk assessments and Safe Work Procedures within 14 days of such changes.

6. SAFE WORK PROCEDURES / METHOD STATEMENTS

Method statements or written safe work procedures shall be documented for all high risk activities:

- Design change or scope change/addition
- Change in job or task
- Introduction of new machinery, equipment or substance.

Method statements or written safe work procedures shall identify following:

- Tasks that are to be undertaken
- The hazards and associated risks of the task(s)
- The control measures for the task(s)
- The equipment and substances that are associated with task(s)
- Any training or qualification needed to do the task
- Personal protective equipment to be worn.

7. INCIDENT MANAGEMENT

7.1 Reporting of accidents and incidents

The Principal Contractor must report all incidents where an employee is injured on duty to the extent that he:

- Dies
- Becomes unconscious
- Loses a limb or part of a limb
- Is injured or becomes ill to such a degree that he is likely either to die or to suffer a permanent physical defect or likely to be unable for a period of at least 14 days either to work or continue with the activity for which he was usually employed

Or where -

- A major incident occurred
- The health or safety of any person was endangered
- Where a dangerous substance was spilled
- The uncontrolled release of any substance under pressure took place
- Machinery or any part of machinery fractured or failed resulting in flying, falling or uncontrolled moving objects
- Machinery ran out of control

to Johannesburg Water SOC Ltd within two days and to the Provincial Director of the Department of Labour within seven days from date of incident (Section 24 of the Occupational Health and Safety Act (Act no. 85 of 1993) and General Administrative Regulations), except that, where a person has died, has become unconscious for any reason or has lost a limb or part of a limb or may die or suffer a permanent physical defect, the incident must be reported to

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both Johannesburg Water SOC Ltd and the Provincial Director of the Department of Labour forthwith by telephone, telefax or e-mail.

- All other reports required by this specification must also be completed. Reporting of accidents / incidents to Johannesburg Water SOC Ltd will be on the prescribed format.
- The Principal Contractor is required to provide Johannesburg Water SOC Ltd with copies of all statutory reports required in terms of the Occupational Health and Safety Act (Act no. 85 of 1993) within 7 days of the incident occurring.
- The Principal Contractor is required to provide Johannesburg Water SOC Ltd with copies of all internal and external accident/incident investigation reports, within 7 days of the incident occurring.

7.2 Accident and incident investigation

- The Principal Contractor is responsible for the investigation of all accidents and/or incidents where employees and non-employees were injured to the extent that they had to receive medical treatment other than first aid.
- The results of the investigation are to be entered into the accident and/or incident register. The Principal Contractor is responsible for the investigation of all incidents, including those described in Section 24 (1) (b) and (c) of the Occupational Health and Safety Act (Act no. 85 of 1993) and for keeping a record of the results of the investigations including the steps taken to prevent similar accidents in future.
- The Principal Contractor is responsible for the investigation of all road traffic accidents, related to the construction activities, and for keeping a record of the results of the investigations including the steps taken to prevent similar accidents in future.
- Johannesburg Water SOC Ltd reserves the right to hold its own investigation into an incident or call for an independent external investigation.

7.3 Close out

- All incident investigation reports will be closed out once all the recommendations to prevent further incidents have been implemented.
- A copy of the investigation report must be handed to JW Safety Officer conducting the investigation.

8. MEDICAL SCREENING REQUIREMENTS

- The Principal Contractor shall ensure that a medical surveillance programme is implemented for all employees.
- An initial health evaluation shall be carried out by an occupational health practitioner immediately, before after a person commences employment, where any exposure exists or may exist, which comprises:
 - an evaluation of the employees medical and occupational history;
 - a physical examination; and
 - any other essential examination which in the opinion of the occupational health practitioner is desirable in order to enable the practitioner to do a proper evaluation.
- Medical surveillance and immunisation shall be done accredited at / by institutions or occupational health personnel, including, but not limited to:
 - Audiograms.
 - A cardio-respiratory examination / Lung function test;
 - Chest X-rays
 - Eye/ sight tests.
 - A general physical examination;
 - A review of previous medical history.
 - Glucose levels
 - Blood pressure

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- An entry medical certificate shall be obtained for all workers prior to commencing with site activities from approved medical institution. Copies of all medical certificates shall be retained in the SHE File prior to site establishment and before an employee is allowed to come onto site.
- Specific attention shall be given to the physical and psychological fitness of people who will be required to work in elevated positions and operators of mobile machinery.
- An exit medical certificate shall be obtained for all workers at the end of the contract and for all workers who leave the employment of the Contractor before the end of the Project. Copies of all exit medical certificates shall be submitted to the Johannesburg Water SOC Ltd Project Specialist or Appointed OHS Agent.

9 EMERGENCY MANAGEMENT

The Principal Contractor must appoint a competent person to act as emergency controller and/or coordinator.

The Principal Contractor must conduct an emergency identification exercise and establish what emergencies could possibly develop. He must then develop detailed contingency plans and emergency procedures, taking into account any emergency plan that Johannesburg Water SOC Ltd may have in place.

In the event where a contractor incorporates the services of a 3rd party service provider for the provision of Emergency Response Services, the following criteria must be met:

- Identification of 3rd party emergency response services (organization & contact details);
- Notification of contractor to 3rd party emergency response service of incorporation of services into contractor's emergency response plan (written agreement / signed letter).

The Principal Contractor and the other contractors must hold regular practice drills of contingency plans and emergency procedures to test them and familiarise employees with them.

First-aid

The Principal Contractor must provide first-aid equipment (including a stretcher) and have qualified first-aiders(s) on site as required by General Safety Regulations promulgated in terms of the Occupational Health and Safety Act (Act no. 85 of 1993).

The contingency plan of the Principal Contractor must include arrangements for the speedy and timeous transporting of injured and/or ill person(s) to a medical facility or of getting emergency medical aid to person(s) who may require it.

The Principal Contractor must have written arrangements in place with his other contractors regarding the responsibility of the other contractors towards their own injured and/or ill employees.

10 SHE TRAINING

All employees in jobs requiring training in terms of the Occupational Health and Safety Act (Act no 85 of 1993) and any other applicable legislative requirements are to be in possession of valid proof of training. Other occupational health, safety and environmental training requirements of the Occupational Health and Safety Act (Act no 85 of 1993) and Construction Regulations can include:

- General induction;
- Site and job specific induction, including visitors;
- Occupational health and safety representatives;
- Training of the legal and nominated appointees;
- Operators and drivers of construction vehicles and mobile plant;
- Basic fire prevention and protection;
- Basic first-aid;
- Storekeeping methods and safe stacking; and
- Emergency planning and coordination
- Incident investigation
- Risk Assessment

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- Planned job observations (supervisors)

All operators, drivers and users of construction vehicles, mobile plant and other equipment are to be in possession of valid proof of training and, where applicable, valid licenses.

12.1 General Job training

The contractor is required to ensure that before an employee commences work their direct supervisor or line manager who is responsible for the employee has informed the employees of his scope of authority, hazards and risks associated with the work to be performed as well as the safety control measure(s). This will involve discussion in connection with any work standard, job description or company policy or procedure.

12.2 Awareness and promotion

The Principal Contractor is required to have a promotion and awareness programme in place to create an occupational health and safety culture within employees. The following are some of the methods that may be used:

- Toolbox talks;
- Posters;
- Videos;
- Competitions;
- Suggestion schemes;
- Participative employee activities such as "occupational health and safety circles".

The Principal Contractor is, at a minimum, required to provide awareness programmes to employees on the following:

- General Health and Safety Awareness
- Environmental Awareness;
- HIV / AIDS awareness.

12.3 General competence requirement

The Principal Contractor shall ensure that his personnel and other contractors' personnel are trained and competent to carry out work safely and without risk to health has been completed before work commences. The Principal Contractor shall ensure that follow-up and refresher training is conducted as the work progresses and whenever the scope or nature of the work changes.

A "**competent person**" in relation to construction work, means any person having the knowledge, training and experience specific to the work or task being performed: Provided that where appropriate qualifications and training are registered in terms of the provisions of the South African Qualifications Authority Act, 1995 (Act No. 58 of 1995), these qualifications and training shall be deemed to be the required qualifications and training. It is the responsibility of the Contractor to determine whether any appropriate qualifications and training are registered in terms of the provisions of the South African Qualifications Authority Act.

Records of all training must be kept in the SHE File. The contents of the file will be audited from time to time.

At a minimum, the Principal Contractor will provide training on Safe Work Procedures / Safe Operating Standards to personnel responsible for performing the related task. Records of training on Safe Work Procedures / Safe Operating Standards will be retained. Competence and skill levels by the employees responsible for performing the task on the implementation of the Safe Work Procedures / Safe Operating Standards will be measured through Planned Job Observations.

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12.4 Site-specific induction training

The Principal Contractor will be required to develop a project specific induction-training course based on the baseline risk assessment for the contract work. He will ensure that all his employees and other contractors and their employees have received training on the submitted induction-training programme.

All employees of the principal and other contractors are to be in possession of proof (on person) that they have attended a site-specific occupational health and safety induction-training course.

No contractor shall allow or permit any employee, visitor or any other person to enter the site, unless such employee or person has undergone health, safety and environmental induction training pertaining to the hazards prevalent on the site at the time of entry.

Where the Principal Contractor is required to operate within Johannesburg Water SOC Ltd Depot's the Principal Contractor will ensure that all employees undergo the Johannesburg Water SOC Ltd induction.

11 PPE REQUIREMENTS

- The Principal Contractor is required to continuously identify the hazards in the workplace and deal with them. He must either remove them or, where impracticable take steps to protect workers and make it possible for them to work safely and without risk to health under the hazardous conditions.
- The Principal Contractor will establish a Personal Protective Equipment Policy and a Personal Protective Equipment study will be conducted to determine the types of Personal Protective Equipment (PPE) to be supplied related to the hazards and risks emanating from the tasks.
- Cognisance shall be given to the gender of individuals required to where PPE; size required by the employee and size issued.
- Personal protective equipment should, however, be the last resort and there should always first be an attempt to apply engineering and other solutions to mitigating hazardous situations before the issuing of personal protective equipment is considered.
- Where it is not possible to create an absolutely safe and healthy workplace the Principal Contractor is required to inform employees regarding this and issue, free of charge, suitable equipment to protect them from any hazards being present and that allows them to work safely and without risk to health in the hazardous environment.
- It is a further requirement that the Principal Contractor maintains the equipment, instructs and trains the employees in the use of the equipment and ensures that the employees use the prescribed equipment.
- Employees do not have the right to refuse to use and/or wear the equipment prescribed by the employer and, if it is impossible for an employee to use or wear the prescribed protective equipment through health or any other reason, the employee cannot be allowed to continue working under the hazardous condition(s) for which the equipment was prescribed. An alternative solution has to be found that may include relocating the employee.
- The Principal Contractor may not charge any fee for protective equipment prescribed by him but may charge for equipment under the following conditions:
 - Where the employee requests additional issue in excess of what is prescribed;
 - Where the employee has patently abused or neglected the equipment leading to early failure; and
 - Where the employee has lost the equipment.

All employees shall, as a minimum, be required to wear the following personal protective equipment on any of Johannesburg Water SOC Ltd's projects:

- Protective overalls;
- Protective footwear;

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- Protective headwear; and
- Eye, face and ear protection.
- NO SHORTS OR DRESSES WILL BE ALLOWED ON SITE!!!

All Personal Protective Equipment will clearly display the branding components of the Principal Contractor's organization (e.g. Name of Organization, logo).

12 DISCIPLINARY PROCESSES

- The contractor is required to implement disciplinary process in order to enforce compliance with requirements.
- All sub-contractors are required to have the same.

13 SITE RULES

- The Principal Contractor must develop a set of site-specific OH&S rules that will be applied to regulate the Health and Safety Plan and associated aspects of the construction.
- When required for a site by law, visitors and non-employees upon entering the site shall be issued with the proper Personal Protective Equipment (PPE) as and when necessary.

14 PUBLIC HEALTH AND SAFETY

The Principal Contractor is responsible for ensuring that non-employees affected by the construction work are made aware of the dangers likely to arise from the construction work as well as the precautionary measures to be observed to avoid or minimise those dangers. This includes:

- Non- employees entering the site for whatever reason;
- The surrounding community; and
- Passers-by the site.
- The Principal Contractor shall organize the site in such a manner that pedestrians and vehicles can move safely and without risks to health, including sufficient and suitable traffic routes and safe walkways with relevant signage.
- Appropriate signage must be posted to this effect and all employees on site must be instructed to ensure that non-employees are protected at all times.
- All non-employees entering the site must receive induction into the hazards and risks of the site and the control measures to be observed.
- The Principal Contractor shall recognize that the Community Liaison Officer (CLO) is the link between Johannesburg Water SOC Ltd and the community and provide all reasonable support to the Community Liaison Officer to ensure relevant responsibilities are fulfilled and positive relationships with the community are maintained.
- Where activities are performed close to public routes, the Principal Contractor will establish a traffic management plan incorporating the requirements of relevant by-laws. At a minimum, barricading, warning signage and flagmen will be provided to ensure the protection of workers from vehicles in transit. Where required, the Principal Contractor will interact with the local traffic department to establish minimum requirements to be implemented on public routes.

15 REFUSAL TO WORK

- Section 14 of the OHS Act states that employees shall carry out any lawful orders given to them, suggesting that they have the right to refuse to obey any unlawful order or work instruction.
- In terms of legal and JW requirements, if an employee has reasonable belief that the work to be carried out is likely to endanger themselves or other persons in any way, he/she has the right to refuse to work.
- An employee may also refuse to work in term of Section 29 of NEMA, if the work would result in imminent and serious threat to the environment.

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- All contractors shall ensure that their employees are conversant with hazards associated with their work and work environment, and be aware of the precautionary measures to take.
- The contractor must ensure that all refusals to work are investigated promptly and resolved timeously.

16 SECURITY

The Principal Contractor must establish site access rules and implement and maintain these throughout the construction period. Access control must, amongst other, include the rule that non-employees will not be allowed on site unaccompanied.

The Principal Contractor must develop a set of security rules and procedures and maintain these throughout the construction period.

The Principal Contractor shall:

- Provide a guardhouse for security personnel. The guardhouse should be in good condition and at-least meet minimum requirements as per Environmental Regulations for Workplaces as promulgated under the Occupational Health and Safety Act (Act no. 85 of 1993).
- Supply an access card containing the name, surname, employee number and photograph for all appointed employees (full or part time) for the site.
- Ensure that no person enters the construction site without wearing the necessary Personal Protective Equipment (PPE).
- Ensure that no children are allowed on the construction site.
- Ensure that no family members are sleeping over on the construction site.
- Ensure that no pets are allowed on the construction site.

17 ACCOMMODATION ON SITE

No employees shall be accommodated on site.

18 WELFARE FACILITIES

The provision of toilets for each sex is required in terms of the National Building Regulations and Construction Regulation 28. Chemical toilets are allowed instead of the water borne sewerage type. Toilets have to be provided at a ratio of 1 toilet per 30 workers. The Principal Contractor shall provide flushing toilets on the construction premises.

- At least cold-water showers for each sex have to be provided at a ratio of 1 shower per 15 workers.
- Some form of screened off changing facility must be provided separately for each sex.
- Some form of eating facility sheltered from the sun, wind and rain must be provided.

The employer needs to provide his employees with the following:

- Potable water for drinking;
- Water and soap for hand washing
- Toilet paper

19 COMPLIANCE MONITORING

19.1 Inspections

- Contractors will be inspected at least once per week by the JW Project Inspectors.
- Feedback of the inspections will be issued immediately on work instructions, and a formal report sent within 7 days of conducting the inspection to all relevant stakeholders.

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- Johannesburg Water SOC Ltd. reserves the right to conduct other ad-hoc assessments and inspections as deemed necessary.
- This may include, amongst other measures, site safety walks. Corrective actions will be identified by Johannesburg Water SOC Ltd. and the Principal Contractor's representative and implemented by the Principal Contractor (at no cost to Johannesburg Water SOC Ltd.) to ensure SHE Performance improvement.

19.2 Monthly audits

- Monthly audits will be conducted within periods not exceeding 30 days.
- The Principal Contractor is to conduct his own monthly internal audits and inspections to verify compliance with his own occupational health and safety plan and management system as well as compliance with the requirements of the Johannesburg Water SOC Ltd. SHE Specification.
- The Principal Contractor will also assess and inspect the compliance of other contractors under its control. Management members of the Principal Contractor will be involved in the internal assessments and inspections.

19.3 Monthly compliance rating

A monthly compliance rating will be calculated for each Principal Contractor as per a formula determined by Johannesburg Water SOC Ltd focussing on or incorporating outcomes of assurance (e.g. monthly audit), operational (e.g. behavioural based safety inspection) assessments and other requirements, as necessary. Johannesburg Water SOC Ltd reserves the right to adjust the monthly compliance calculation formula as and when required – each revision of the monthly compliance calculation formula will be communicated to the Principal Contractor before implementation.

Each Principal Contractor is required to maintain a minimum compliance rating of 93% (Ninety Three Percent).

Scoring	Classification	Classification description
93% -100%	Good	Substantial compliance
80% -92%	Average	Compliance status needs to be improved
60% - 79%	Poor	Methods to ensure compliance require substantial improvement - operations with substantial non-compliance risks
<60%	Very poor	Methods to ensure compliance failed completely - troubled operation with severe non-compliance risks

19.4 Work stoppages

Work stoppages will be identified for 2 (two) types of work stoppages to be implemented:

- Overall work stoppage – the Principal Contractor and its Contractors are not allowed to continue with any type of construction / site work up until the work stoppage has been closed-out;
- Activity work stoppage – The Principal Contractor and its Contractors are not allowed to continue with the specific activity / task / job up until the work stoppage has been closed-out.

Overall work stoppages will be issued where non-conformances are identified against the criteria in the following table.

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	PROJECT LOCATION:	LINBRO PARK
	PROJECT DESCR:	LINBRO WATER UPGRADE

NR	DESCRIPTION OF AUDIT NON-CONFORMANCE / NON-COMPLIANCE
1	NOTIFICATION OF CONSTRUCTION WORK
1.1	Local Department of Labour not notified of construction work before commencement of construction activities
1.2	Notification of construction work not stamped by local Department of Labour (no faxed copies)
1.3	Copy of notification of construction work not available on site
2	PROOF OF REGISTRATION WITH COMPENSATION COMMISSIONER
2.1	Proof of registration with Compensation Commissioner or other insurer not available
2.2	Registration with Compensation Commissioner or other insurer not valid and up-to-date
3	POLICY COMMITMENT & SHE SPECIFICATION
3.1	SHE Plan not compiled, approved by contractor management and available on site
4	SECTION 37(2) AGREEMENT
4.1	Signed section 37(2) Agreement not signed and available on site
5	RISK ASSESSMENTS
5.1	Risk assessments not developed/ not applicable to scope of work issued by Client
6	CONSTRUCTION MANAGER
6.1	No construction manager appointed / available on site
6.2	Appointed construction manager does not meet requirements
6.3	Proof of competency not available on-site
7	SITE SAFETY OFFICER
7.1	No safety officer appointed/ available on site
7.2	Safety officer does not meet requirements
8	SHE FILE
8.1	No file on site

Activity work stoppages will be issued where non-conformance are identified per activity where the health and safety of employees or the public is compromised.

20.4 Non-compliance management process

The following actions will be instituted where non-conformances are identified in terms of compliance to relevant legislative requirements and the Johannesburg Water SOC Ltd SHE Specification.

CRITERIA	ACTION TO BE INSTITUTED	RESPONSIBLE PARTY
Compliance rating: 93-100%	Non-conformance closure	Principal Contractor / Contractor
Compliance rating: 80-92%	Letter of compliance improvement to Principal Contractor	Johannesburg Water SOC Ltd

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CRITERIA	ACTION TO BE INSTITUTED	RESPONSIBLE PARTY
Compliance rating: 60-79%	Non-conformance closure	Principal Contractor / Contractor
	Non-compliance hearing	Johannesburg Water SOC Ltd
	Letter of commitment for performance improvement	Principal Contractor / Contractor
	Non-conformance closure	Principal Contractor / Contractor
Compliance rating: <60%	Non-compliance hearing	Johannesburg Water SOC Ltd
	Letter of commitment for performance improvement	Principal Contractor / Contractor
	Non-conformance closure	Principal Contractor / Contractor
	Supply Chain Management to be informed of non-compliance standing	Johannesburg Water SOC Ltd
3 x Work stoppages	Non-compliance hearing	Johannesburg Water SOC Ltd
	Letter of commitment for performance improvement	Principal Contractor / Contractor
	Non-conformance closure	Principal Contractor / Contractor
	Supply Chain Management to be informed of non-compliance standing	Johannesburg Water SOC Ltd
3 x Non-conformance to <93% monthly compliance rating	Non-compliance hearing	Johannesburg Water SOC Ltd
	Letter of commitment for performance improvement	Principal Contractor / Contractor
	Non-conformance closure	Principal Contractor / Contractor
	Supply Chain Management to be informed of non-compliance standing	Johannesburg Water SOC Ltd
3 x consecutive repeat findings	Non-compliance hearing	Johannesburg Water SOC Ltd
	Letter of commitment for performance improvement	Principal Contractor / Contractor
	Non-conformance closure	Principal Contractor / Contractor
	Escalation to SCMU & CAPEX	Johannesburg Water SOC Ltd

20 OPERATIONAL REQUIREMENTS

20.1 EXCAVATIONS

- Where excavations will exceed 1.5 m in depth the contractor will be required to submit a method statement to Johannesburg Water SOC Ltd for approval before commencing with the excavation and Johannesburg Water SOC Ltd will issue a permit to proceed once the risk assessment and method statement is approved.
- Excavations must be limited to 100m per day, or equated to the amount of work to be done for the day.
- All open excavations shall be closed within 3 days of excavation. No excavation will remain open beyond 3 days or during holidays.

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- Excavation work must be carried out under the supervision of a competent person, who has been appointed in writing, with at least two years' experience in excavation work. Before excavation work begins the stability of the ground must be evaluated.
- Whilst excavation work is being performed, the contractor must take suitable and sufficient steps to prevent any person from being buried or trapped by a fall or dislodgement of material.
- No person may be required or permitted to work in an excavation that has not been adequately shored or braced.
- Where the excavation is in stable material and where the sides of the excavation are sloped back to at least the angle of repose of the excavated material, shoring or bracing may be left out but only after written permission has been obtained from the appointed competent person.
- Shoring and bracing must be designed and constructed to safely support the sides of the excavation.
- Where uncertainty exists regarding the stability of the soil the opinion of a competent professional engineer or professional technologist must be obtained whose opinion will be decisive. The opinion must be in writing and signed by the engineer or technologist as well as the appointed competent person.
- No load or material may be placed near the edge of an excavation unless suitable shoring has been installed to be able to carry the additional load.
- Neighbouring/adjoining buildings, structures or roads that may be affected or endangered by the excavation must be suitably protected.
- Every excavation must be provided with means of access that must be within 6 metres of any worker within the excavation.
- The location and nature of any existing services such as water, electricity, gas etc. must be established before any excavation is commenced with and any service that may be affected by the excavation must be protected and made safe for workers in the excavation.
- The appointed competent person must inspect every excavation, including the shoring and bracing or any other method to prevent collapse, as follows:
 - Daily before work commences
 - After every blasting operation
 - After an unexpected collapse of the excavation
 - After substantial damage to any supports
 - After rain
- The results of any inspections must be recorded in a register kept on site and in the safety file.
- Every excavation accessible to the public or that is adjacent to a public road or thoroughfare or that threatens the safety of persons, must be adequately barricaded or fenced to at least one meter high and as close to the excavation as practicable, regardless of the depth of the excavation.
- Every excavation must be provided with warning lights or visible boundary indicators after dark or when visibility is poor.
- Upon entering an excavation the requirements of General Safety Regulation 5, work in confined spaces, must be observed:
- Any confined space may only be entered after the air quality has been tested to ensure that it is safe to breathe and does not contain any flammable or noxious air mixture.
- The confined space must be purged and ventilated of any hazardous or flammable gas, vapour, dust or fumes.
- The safe atmosphere must be maintained and, where necessary.
- Employees are to be provided with breathing apparatus and must wear a safety harness with a rope with the free end of the rope being continuously attended to by a person outside the confined space.
- Furthermore, an additional person, trained in resuscitation, to be in full-time attendance immediately outside the confined space.

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- Additional serviceable breathing and rescue apparatus is kept immediately outside the confined space for rescue purposes.
- All pipes, ducts etc. that may leak into the confined space to be blanked off sufficiently to prevent any leakage or seepage.
- The employer must ensure that all employees have left the confined space after the completion of work.
- Where flammable gas is present in a confined space no work may be performed in close proximity to the flammable atmosphere.
- Excavations and other openings must be provided with sufficient barriers to prevent construction vehicles and mobile plant from falling into them.
- Excavations left open for extended periods of time (exceeding 48 hours) must be approved the relevant Engineer / Construction Supervisor.

20.2 EXISTING SERVICES

- The Contractor shall note that although the drawings have been prepared using available information they show only the approximate positions of existing services where applicable.
- The information is supplied in good faith but shall be used as a guide only and does not relieve the Contractor of his responsibility to exercise due caution when working in areas where existing services can reasonably be expected, nor his obligation to liaise with the authorities in this regard and the obtaining of the necessary work permits and wayleaves.
- The Contractor shall be responsible to locate and safeguard any existing service he may encounter during construction. The Contractor shall be responsible for any damage to such existing services and works in the execution of this contract and shall reimburse the Employer, authority or the owner concerned for any repairs required following damages due to the Contractor's negligence.
- The Contractor shall be responsible for immediately notifying the Engineer and the authorities concerned regarding any damage caused to public services and existing works.
- Any alterations to public services shall be carried out by the Authority concerned unless the Contractor is instructed otherwise.

20.3 SETTING OUT OF WORKS

- Reference and level beacons will be shown to the Contractor by the Engineer at the commencement of the Contract and the Contractor will be responsible for transferring the datum to the Site of Works.
- The Contractor shall check the condition and accuracy of all reference and level beacons and satisfy himself that they have not been disturbed and are true with regard to position and level. A beacon that has been disturbed shall not be used until its true position and level have been re-established and the new values have been certified by the Engineer. The Contractor shall thereafter be held entirely responsible for the protection of all reference and level beacons.
- The Contractor shall employ a capable surveyor to set out the Works to the required lines and levels. The Engineer shall be informed immediately should any discrepancy be discovered between the levels or dimensions obtained by the Contractor and those shown on the drawings.
- Where a beacon is likely to be disturbed during construction operations, the Contractor shall establish suitable reference beacons at locations where they will not be disturbed during construction. No beacons shall be covered over, disturbed or destroyed before accurate reference beacons have been established and details of the positions and levels of such beacons have been submitted to the Engineer. The

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Contractor's reference beacons shall be of at least the same accuracy and sturdiness of construction as the existing beacons.

- The Contractor shall submit the method of setting out he proposes to employ to the Engineer. Accurate control of line and level shall be provided by the Contractor at all stages of construction.
- Work set out by the Contractor may be checked by the Engineer and any errors found shall be rectified by the Contractor at his own expense. The Contractor shall supply any instrument, equipment, material and labour required by the Engineer for this survey work. Any assistance, including checking given to the Contractor by the Engineer or any setting out done by the Engineer for Contractor shall not be held as relieving the Contractor of his responsibility for the accurate construction of the Works.
- The Contractor's survey instruments and survey equipment shall be suitable for the accurate setting out of the Works and shall be subject to the approval of the Engineer. They shall furthermore be checked and correctly adjusted by the authorized agents before the commencement of the contract and subsequently when required by the Engineer and when otherwise necessary.
- Survey work shall not be measured and paid for directly and compensation for the work involved in setting out shall be deemed to be covered by the rates tendered and paid for the various items of work included under the contract.

20.4 CONFINED SPACE ENTRY

- Enclosed space work necessitates a Confined Space Permit. This may only be obtained from the authorized person nominated in writing.
- The responsibility for safe procedure, both at the time of entry and during the entire operation of entering and working in confined spaces, rests with the Contractor.
- The Contractor shall be sure that adequate steps have been taken to eliminate or control hazards.
- Before working in an area that contains dust, the area is to be ventilated and hosed down to settle and dampen the dust.
- The Contractor shall provide all necessary equipment to manage confined spaces, including all necessary monitoring and rescue equipment (such as tripods, breathing equipment and the like).
- The Contractor shall ensure all persons working in a confined space or managing entry to a confined space are appropriately trained.
- Compulsory - Continuous monitoring, trained rescue teams, radio communication & adequate ventilation.

Pump sumps & valve chambers

Ventilation

- All available manholes or ventilation covers must be removed and the compartment ventilated for 10 (ten) to 15 (fifteen) minutes, using compressed air or a portable blower.
- Such ventilation must be continued while personnel are in the compartment.
- Ensure that exhaust fumes from blower do not enter the confined space.
- Before entering any sump or compartment, the atmosphere must be tested by the Principal Contractor's competent person (trained by the supplier of the gas monitoring equipment) by lowering the gas monitoring equipment to the bottom of the sump or compartment by means of a rope.
- A register must be kept indicating that the atmosphere has been tested and that the sump or compartment is fit to work in.
- The Principal Contractor's construction supervisor must check and co-sign this register each time he visits a site to ensure that the atmosphere is continuously being monitored.

Entering sump

- When entering a sump the person entering the sump must wear the safety harness, gas detector as well as a self-rescuer.

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- A lifeline must be attached to the safety harness and a person on the surface must be in continuous contact with the person in the sump.
- At least one person on the surface must be trained in basic first aid and CPR and a first aid kit with resuscitation equipment must be available outside the entrance of the confined space for emergencies.
- Should the alarm sound when a person is in the confined space, the area must be evacuated immediately and the atmosphere re-tested and certified safe before re-entry into the confined space.
- In no circumstance shall any person remain within a sump for a period of more than one hour at a time.
- A five-minute rest on the surface must be taken after this period before re-entering.
- No naked lights, smoking or unprotected electrical apparatus which may cause sparks, shall be permitted in any sump or in their vicinity.

Confined spaces & water chambers

General

- All employees working in confined spaces or sewer manholes must be issued with gas monitoring equipment and safety harnesses and self- rescuers where applicable.
- All these employees must be trained in their use.
- Where over pumping between manholes is involved, only leakage free pumping machines and conveyance tubes will be allowed.
- Under no circumstances may any confined space be entered unless it has been certified safe to work in.
- Safety harnesses and attachments must be checked for damage to webbing, metal fittings and ropes on a monthly basis and the findings recorded in a register.
- Should a harness be damaged, it must be reported to the construction supervisor immediately.

The following records shall be taken and maintained by the Principal Contractor:

- Confined space entry permits
- Confined space entry registers
- Safety harness registers

Ventilation

- All available manholes or ventilation covers must be removed and the chamber ventilated for 10 (ten) to 15 (fifteen) minutes, using compressed air or a portable blower.
- Such ventilation must be continued while personnel are in the chamber.
- Ensure that exhaust fumes from blower do not enter the confined space.
- Before entering any chamber, the atmosphere must be tested by the Principal Contractor's competent person (trained by the supplier of the gas monitoring equipment) by lowering the gas monitoring equipment to the bottom of the chamber by means of a rope.
- A register must be kept indicating that the atmosphere has been tested and that the area is fit to work in.
- The Principal Contractor's construction supervisor must check and co-sign this register every time he visits the site to ensure that the atmosphere is continuously being monitored.
- Fumes must be extracted from the chamber while welding.

Entering chamber

- When entering a chamber the person entering the chamber must wear a safety harness as well as the gas detector.
- A lifeline must be attached to the safety harness and a person on the surface must be in continuous contact with the person in the manhole.
- At least one person on the surface must be trained in basic first aid and CPR and a first aid kit with resuscitation equipment must be available outside the entrance of the confined space for emergencies.
- In no circumstances shall any person remain within a chamber for a period of more than one hour at a time.
- A five-minute rest on the surface must be taken after this period before re-entering.
- Should the alarm sound when a person is in the confined space, the area must be evacuated immediately and the atmosphere re-tested and certified safe before re-entry into the confined space.

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- When the activity to undertake inside the pipeline includes the use of any hazardous chemical substances or substances, which might cause hazardous fumes or gasses the contractor, must comply with 5.24 Hazardous Chemical Substances.

Safety equipment

- All teams must be issued with gas monitoring equipment and safety harnesses and self-rescuers where applicable.
- All employees must be trained in the use thereof.

20.5 BARRICADING

- Barricading plans are to be presented by the Principal Contractor for any major operations involving site works for approval by Johannesburg Water SOC Ltd. Where areas are unsafe, they should be enclosed with barricading. Examples are people working overhead, welding splatter etc.
- Where there is a risk of injury, the area should be barricaded off with secure solid barricades.
- Barricading for the prevention of access into areas with a potential risk of injury shall as a minimum be constructed of a handrail, knee-rail and appropriately supported as to prevent any person from falling into the restricted/risk area.
- Appropriate signage shall be affixed to the barricade indicating the risk associated (i.e. deep excavation, lifting operations etc.) and the responsible Supervisor and contact details shall be displayed. All barricading shall have a "No Entry" signs on all sides and at each change of direction. Signage shall be placed at 20 m intervals where lengths exceed. All signage shall be a minimum size of 290 mm x 290 mm.
- Danger tape shall not be utilised to prevent personnel from entering into areas.
- Where no risk exists of injury to personnel such as stacking and storage areas, the use of wire for hand and knee rails netting shall be acceptable to demarcate the area.
- All barricades will have a dedicated entrance where it is required that personnel enter the areas.
- Appropriate signage shall be placed at the entrance indicating which Contractor has right of entry.
- It is the Contractor's responsibility to remove all redundant barricades directly after use. The Contractor's Safety Officers will maintain a marked-up site plan indicating where barricades are erected.
- It will be a requirement that the contractor protects employees against contact with exposed rebar and poles by the installation of rebar-caps on all exposed areas where there is a potential that an employee could be injured.

20.6 SYMBOLIC SIGNAGE

Contractors shall use mandatory and prescribed symbolic safety signs at their lay down and site areas. The display of the following signs is mandatory:

- "Radio-Active Material" symbolic signs at radioactive storage areas.
- "Eye Protection" symbolic signs shall be displayed at all grinding machines and at any area where it is mandatory to wear eye protection or where there is danger of an eye injury being sustained.
- "Ear Protection" symbolic signs shall be displayed at all areas where there is a danger of noise induced hearing loss being sustained.
- Every separate room of a workplace shall be consecutively numbered.
- All toilets or urinals shall be marked in a conspicuous place with painted or stencilled letters to indicate the sex for which they are intended.
- The location of every first aid box is to be clearly indicated by means of a sign.
- In any room, cabinet or enclosure where flammable substances are used or stored shall be fixed a suitable and conspicuous sign prohibiting smoking or the use of naked flames in the area.
- At the entrance to premises where machinery is used
- Restricted access on "Authorised Person Only" signs on entry. "No person shall enter the workplace or premises without the permission of the employer or user of the machinery".
- At every place where machinery is used a notice (English & Pictograms) shall be posted.

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- Explosive Power Tool shall have a sign warning people when it is in use.
- Electrical Control Gear. A notice shall be posted so as to warn against the re-closing of a switch of control gear whilst a person is working on such equipment.
- Emergency contact telephone numbers.
- Adequate scaffolding signs. (When applicable).
- Adequate fire fighting equipment signs.
- Speed limit signs.
- Warning notices at openings through which people may fall.
- Risk based signage depending on the task being performed e.g.:
 - "Men working above", "Men working below", "Road closed – detour", "Excavation in progress", "No walkway" etc.;
- No-entry signs to incomplete platforms

The Principal Contractor shall install a notification board indicating the following information at the site entrance:

- Johannesburg Water SOC Ltd project number;
- Principal Contractor identification details (name, telephone number)
- Name and contact details of Construction Supervisor;
- Name and contact details of site safety officer;
- Monthly compliance rating;
- Lost Time Injury Rate;

The Principal Contractor will ensure that information on the notification board is kept up-to-date.

20.7 USE AND STORAGE OF FLAMMABLES

The Principal Contractor to ensure that:

- No person is required or permitted to work in a place where there is the danger of fire or an explosion due to flammable vapours being present unless adequate precautions are taken;
- No flammable material is used or applied e.g. in spray painting, unless in a room or cabinet or other enclosure specially designed and constructed for the purpose unless there is no danger of fire or explosion due to the application of adequate ventilation;
- The workplace is effectively ventilated. Where this cannot be achieved:
 - Employees must wear suitable respiratory equipment
 - No smoking or other source of ignition is allowed in the area
 - The area is conspicuously demarcated as "flammable"
- Flammables stored on a construction site are stored in a well-ventilated, reasonably fire-resistant container, cage or room that is kept locked with access control measures in place. Sufficient fire fighting equipment is installed and fire prevention methods practiced. Proper housekeeping may achieve this;
- Flammables stored in a permanent flammable store are stored so that no fire or explosion is caused.
- Stored in a locked and well-ventilated reasonably fire resistant container, cage or room conspicuously demarcated as "Flammable Store – No Smoking or Naked Lights"
- The flammables store to be constructed of two-hour fire retardant walls and roof and separated from adjoining rooms or workplaces by means of a two-hour fire retardant fire wall
- Adequate and suitable fire fighting equipment installed around the flammables store and marked with the prescribed signs
- All electrical switches and fittings to be of a flameproof design
- Any work done with tools in a flammable store or work areas to be of a non-sparking nature
- No Class A combustibles such as paper, cardboard, wood, plastic, straw and the like to be stored together with flammables
- The flammable store to be designed and constructed such that in the event of spillage of liquids the store is able to contain the full quantity + 10% of the liquids stored
- A sign indicating the capacity of the store to be displayed on the door
- Only one day's quantity of flammable is to be kept in the workplace;

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- Containers (including empty containers) to be kept closed to prevent fumes/vapours from escaping and accumulating in low lying areas;
- Metal containers to be bonded to earth whilst decanting to prevent build-up of static forces; and
- Welding and other flammable gases to be stored segregated according to the type of gas and empty and full cylinders.

20.8 HAZARDOUS CHEMICAL SUBSTANCES

The Principal Contractor must ensure that:

- Employees receive the necessary information and training to be able to use and store hazardous chemical substances safely;
- Employees obey lawful instructions regarding:
 - The wearing and use of protective equipment
 - The use and storage of hazardous chemical substances
 - The prevention of the release of hazardous chemical substances
 - The wearing of exposure monitoring and measuring equipment
 - The cleaning up and disposal of materials containing hazardous chemical substances
 - Housekeeping, personal hygiene and the protection of the environment
- The risk assessments required in terms of Construction Regulation include employee exposure to hazardous chemical substances and that the necessary measures be taken to protect persons from being detrimentally affected by hazardous chemical substances present or used in the workplace;
- Suppliers provide the necessary information in the form of a material safety data sheet regarding a hazardous chemical substances required to ensure the safe use and storage of that substances;
- An up-to-date list is kept on site of hazardous chemical substances stored and used together with the material safety data sheet of the hazardous chemical substances;
- Hazardous chemical substances containers be clearly marked with the contents and main hazardous category e.g. "Flammable" or "Corrosive" and the reference number of the hazardous chemical substances on the list indicated above;
- Hazardous chemical substances, for example asbestos dust, are not cleared by using compressed air but should be vacuumed;
- No person eats or drinks in a hazardous chemical substances workplace; and
- Hazardous chemical substances waste is disposed of safely in terms of hazardous waste disposal requirements.
- MSDS's to be in 16 point format- available onsite

20.9 FIRE PREVENTION AND PROTECTION

The Principal Contractor must ensure that:

- The risk of fire is avoided;
- Sufficient and suitable storage for flammables is provided;
- Sources of ignition are removed wherever flammable or highly combustible material is present in the workplace, for example:
 - Notices prohibiting smoking are displayed and enforced
 - Welding and flame cutting is only allowed under controlled conditions that includes written hot work permits
 - Only spark-free hand and power tools are used
 - No grinding, cutting and shaping of ferrous metals is allowed using electrically driven power tools that produce sparks
 - Flameproof switches and fittings are to be used in the flammable atmosphere
 - Good housekeeping is maintained to prevent the accumulation of unnecessary combustibles
 - Adequate ventilation is maintained
 - Adequate and suitable fixed and portable fire fighting equipment is provided and maintained in good working order.

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- Maintenance must include:
 - Regular inspection of fire equipment by a competent person appointed in writing and keeping a register
 - Annual inspection and service by an accredited service provider
- All employees are instructed in the use of the fire fighting equipment and know how to attempt to extinguish a fire;
- A sufficient number of employees are appointed and trained to act as an emergency team to deal with fires and other emergencies;
- Employees are informed regarding emergency evacuation procedures and escape routes;
- Emergency escape routes are kept clear at all times and clearly marked;
- Evacuation assembly points are demarcated;
- Evacuation is practiced to ensure that all persons are evacuated timeously;
- Roll call is held after evacuation to account for all personnel and ensure that no-one has been left behind; and
- A siren or alarm is fitted which is clearly audible to all persons on site.

20.10 STACKING AND STORAGE

The Principal Contractor must ensure that:

- A competent person is appointed in writing to supervise all stacking and storage on a construction site;
- Adequate storage areas are provided and demarcated;
- The storage areas are kept neat and under control;
- The base of any stack is level and capable of sustaining the weight exerted on it by the stack;
- The items in the lower layers can support the weight exerted by the top layers;
- Cartons and other containers that may become unstable due to wet conditions are kept dry;
- Pallets and containers are in good condition and no material is allowed to spill out;
- The height of any stack does not exceed 3 times the base unless stepped back at least half the depth of a single container at least every fifth tier or the approval of an inspector has been obtained to build the stacks higher with the aid of a machine. The operator of the machine must be protected against items falling from overhead off the stack and no items may overhang;
- The articles that make up a single tier are consistently of the same size, shape and mass;
- Structures for supporting stacks are structurally sound and able to support the mass of the stack;
- No articles are removed from the bottom of the stack first but from the top tier first;
- Anybody climbing onto a stack must do it in a safe manner, taking reasonable safety precautions, and ensuring that the stack is stable and capable of supporting him or her
- Stacks that are in danger of collapsing are broken down and restacked;
- Stability of stacks are not threatened by vehicles or other moving plant and machinery;
- Stacks are built in a header and stretcher fashion and that corners are securely bonded;
- Stacks are stepped back at least half the depth of a single container at least every fifth tier; and
- Persons climbing onto stacks do not approach unguarded moving machinery or electrical installations.
- Laydown area is allocated for Contractor-supplied items.
- At all times, the Contractor shall be responsible for the safe and adequate storage of all materials and equipment on site which he is to install, whether they are supplied by himself or others.
- The safe handling, unloading and loading of material receipts and dispatches at site or storage areas shall be the Contractors' responsibility.

The Contractor shall provide a suitable and adequate lock-up store for the storage of items of equipment and material, which would be damaged or pilfered if stored in the open. The Principal Contractor shall provide all facilities required for weather-proofing, dust proofing or vermin proofing.

The Contractor is responsible for the proper storage and maintenance of all equipment until issue of the Certificate of Practical Completion.

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All equipment and materials will be stored on suitable wood poles or pallets which will not protrude more than a meter from any of the stored material. Safe access ways shall be maintained between all stored items preventing employees from having to climb over or under equipment to retrieve the necessary.

20.11 HOUSEKEEPING

The Principal Contractor to ensure that:

- Housekeeping is continuously implemented and maintained;
- Materials and equipment are properly stored;
- Scrap, waste and debris is removed regularly;
- Materials placed for use are placed safely and not allowed to accumulate or cause obstruction to the free-flow of pedestrians and vehicular traffic;
- Waste and debris not to be removed from heights by throwing but rather by chute or crane;
- Where practicable, construction sites are fenced off to prevent entry of unauthorised persons;
- Catch platforms or nets are erected over entry and exit ways or over places where persons are working to prevent them being struck by falling objects;
- An unimpeded work space is maintained for every employee;
- Every workplace is kept clean, orderly and free of tools, materials and the like that are not required for the work being done;
- As far as is practicable, every floor, walkway, stair, passage and gangway is kept in good state of repair, skid-free and free of obstruction, waste and materials;
- The walls and roof of every indoors workplace sound and leak-free; and
- Openings in floors, hatchways, stairways and open sides of floors or buildings are barricaded, fenced, boarded over or provided with protection to prevent persons from falling.

20.12 PUBLIC HEALTH AND SAFETY

The Principal Contractor is responsible for ensuring that non-employees affected by the construction work are made aware of the dangers likely to arise from the construction work as well as the precautionary measures to be observed to avoid or minimise those dangers. This includes:

- Non- employees entering the site for whatever reason;
- The surrounding community; and
- Passers-by the site.
- The Principal Contractor shall organize the site in such a manner that pedestrians and vehicles can move safely and without risks to health, including sufficient and suitable traffic routes and safe walkways with relevant signage.
- Appropriate signage must be posted to this effect and all employees on site must be instructed to ensure that non-employees are protected at all times. All non-employees entering the site must receive induction into the hazards and risks of the site and the control measures to be observed.
- The Principal Contractor shall recognize that the Community Liaison Officer (CLO) is the link between Johannesburg Water SOC Ltd and the community and provide all reasonable support to the Community Liaison Officer to ensure relevant responsibilities are fulfilled and positive relationships with the community are maintained.

20.13 TRAFFIC MANAGEMENT

- Where activities are performed close to public routes, the Principal Contractor will establish a traffic management plan incorporating the requirements of relevant by-laws.
- At a minimum, barricading, warning signage and flagmen will be provided to ensure the protection of workers from vehicles in transit.
- Where required, the Principal Contractor will interact with the local traffic department to establish minimum requirements to be implemented on public routes.

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20.14 HAND TOOLS

The Principal Contractor must inspect all hand tools before it is brought onto the site.

- As far as possible all hand tools must be numbered and placed on register to be inspected monthly by a person designated to do so.
- Any tools found to be in an unsafe condition must immediately be removed from service and either discarded or rectified.
- No chisels with “mushroomed” heads must be used.
- No hammer shall be used with a cracked or damaged handle.
- All files must be fitted with handles.
- All trolleys, pushcarts, etc. used on site must be identifiable, placed on register and inspected at least once every month.
- Non-sparking tools must be used in areas where the risk of fire or explosion is present.
- No homemade hand tools are allowed on the project.
- All tools shall be attached to a suitable lanyard when utilised in elevated positions

20.15 PORTABLE ELECTRICAL EQUIPMENT

Portable electrical tools and equipment includes every unit that takes electrical power from a 15 ampere plug point and is moved around for use in the workplace for example; drills, saws, grindstones, portable lights, etcetera. Other electrical appliances such as fridges, hotplates, heaters, and etcetera must be inspected and maintained to the same standards as portable electrical tools and appliances.

The use, inspection and maintenance of portable electrical tools and equipment shall be as follows:

- Periodical inspections must be carried out by a competent person appointed in writing;
- Inspection results must be recorded in a register;
- Only competent authorised persons are allowed to use portable electrical tools and equipment; and
- The correct protective equipment must be worn or used whilst operating portable electrical tools and equipment.

This equipment:

- Must be maintained in good condition at all times to prevent an electrical shock to the user;
- The main power source should incorporate an earth leakage protection device or receive power through a double wound transformer or be double insulated and clearly marked as such; and
- All equipment must be fitted with a switch to allow for safe and easy starting and stopping.

The following requirements apply to portable lights:

- Must be fitted with a robust non-hygroscopic non-conducting handle;
- Live metal parts or parts which may become live must be protected against contact;
- The lamp must be protected by a strong guard;
- The cable lead-in must withstand rough handling;
- Inspections must be undertaken that concentrate on plug, cord, switch and any obvious faults;
- A register be kept for each piece of equipment with findings of regular inspections undertaken to evaluate the condition of these lights; and
- When used in wet/damp/metal container conditions, the lamp must be protected.

20.16 LIFTING EQUIPMENT & MACHINERY

Lifting equipment must be designed and constructed in accordance with the manufactures/designers specifications as well as generally accepted technical standards and operated, used, inspected and maintained in accordance with the manufactures requirements as well as that of the of Driven Machinery Regulations promulgated in terms of the Occupational Health and Safety Act (Act no 85 of 1993).

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The Driven Machinery Regulations requires that:

- Lifting equipment is clearly and conspicuously marked with the maximum mass load (MML) that it is designed to carry safely. When the MML varies with the conditions of use a table showing the maximum mass load with respect to every variable condition shall be posted up by the user in a conspicuous, place easily visible to the operator and the table shall be used by the driver/operator;
- Each winch on a lifting machine must at all times have, at least, three full turns of rope on the drum when the winch has been run to its lowest limit;
- Lifting equipment shall be fitted with a brake or other device capable of holding the MML. This brake or device shall automatically prevent the downward movement of the load when the lifting power is interrupted;
- Lifting equipment shall be fitted with a load limiting device that automatically arrest the lift when the load reaches its highest safe position or when the mass of the load is greater than the MML;
- Every chain or rope on a lifting machine that forms an integral part of the machine must have a factor of safety as prescribed by the manufacturer of the machine. Where no standard is available the factor of safety must be:
 - chains – 4 (four)
 - steel wire ropes 5 (five)
 - fibre ropes- 10 (ten)
- Every hook or load attaching device must be designed to prevent the load from slipping off or disconnecting;
- Every lifting machine must be inspected and load tested by a competent person every time it has been dismantled and re-erected and every 12 months after that. The load test must be in accordance with the manufacturer's requirements or to 110% of the MML. In addition, all ropes, chains, hooks or other attaching devices, sheaves, brakes and safety devices forming an integral part of a lifting machine must be inspected every 6 months by a competent person;
- All maintenance, repairs, alterations and inspection results must be recorded in a log book and each lifting machine must have its own log book; and
- No person may be lifted by a lifting machine not designed for lifting persons unless in a cradle approved by the inspector of the Department of Labour.

General requirements for cranes and lifting equipment

All documentation must be provided to the Johannesburg Water SOC Ltd Project Engineer prior to mobilisation. Failure to do so and the resulting cost of any delays and/or remedial activities will be for the Contractor's account.

All crane operators must be authorised by the relevant Engineer before they may operate a crane or lifting machine. The Load charts must be displayed at the crane.

Daily pre-use inspections of the cranes must be done and be kept on the file. The inspections must be logged in a logbook. The area in which a lift is performed must always be barricaded to prevent employees from entering.

A crane or lifting machine must not be left unattended and the keys may never be left in the ignition when the operator is not present. Properly constructed out rigger pads must be used when soil is uneven or unstable. (Only sleepers or appropriately designed steel plate pads may be used for this purpose).

Only a competent rigger may direct a lift of any kind unless the following requirements are met. Rigger assistants used for performing lifting operations shall be limited to lifts with all of the following requirements:

- Lifts lower than 5 tons
- Easy lifts that does not require the load to be lifted over structures, equipment or machinery
- Equipment that is not critical
- Rigging configuration that requires the attachment of several parts of lifting equipment such as chain blocks to adjust the angle of loads.
- All safety devices on a crane or lifting machine must be functional.

Certification will be required for record purpose, and shall cover the following:

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- A Brake or other device capable of holding the maximum mass should the power fail, or which is such that it shall automatically prevent the uncontrolled downward movement of the load when the raising effort is interrupted; and
- A Limiting device which shall automatically arrest the driving effort when:
- The Hook or Load attachment point of the Power Driven lifting machine reaches its highest safe position; and
- In the case of a Winch Operated lifting machine with a lifting capacity of 5000kg or more, the load is greater than the rated mass load of such machine.

The user shall ensure that every lifting machine is operated by an Operator specifically trained for a particular type of lifting machine; the user shall not require or permit a person to operate such lifting machine unless the operator is in possession of a certificate of training, issued by an accredited person or organisation.

No Crane shall be used at arrival on site before copies of all documentation have been handed over to the Johannesburg Water SOC Ltd and the Crane have been checked by a person duly authorised and signed off as acceptable. Copies of all documentation shall be kept in the SHE File at all times.

No Crane shall be used without a pre-use check and findings entered on an approved checklist. Before any cranes are established on site the following must be inspected and approved:

- Operator's licences
- Training certificates
- Medical fitness certificate.
- The cranes load test certificate.
- Rope test certificates including Mill / Destructive test.
- The lifting gear load test certificates.
- The load limiting device calibration certificate.
- Proof that the hooks have been measured for spreading.
- The service inspection history.
- Monthly comprehensive inspection certificate
- Operation and maintenance Manuals and crane condition.

Cranes and Lifting Machines

A contractor shall ensure that where tower cranes are used:

- Account is taken of the effects of wind forces on the structure;
- Account is taken of the bearing capacity of the ground on which the tower crane is to stand;
- The bases for the tower cranes and tracks for rail-mounted tower cranes are firm and level;
- The tower cranes are erected at a safe distance from excavations;
- There is sufficient clear space available for erection, operation and dismantling;
- The tower crane operators are competent to carry out the work safely; and
- The tower crane operators are physically and psychologically fit to work in such an environment by being in possession of a medical certificate of fitness."

No user shall use or permit any person to use a Jib-Crane with a lifting capacity of 5000kg or more at a minimum Jib radius, unless it is provided with:

- A load indicator that shall indicate to the operator of the Jib-Crane the mass of the load being lifted, provided that such a device shall not require manual adjustment from the application of the load, to the Jib-Crane, until the release of the load.
- A Limiting Device, which shall automatically arrest the driving effort whenever the load is lifted, is greater than the rated mass load of the Jib-Crane.

Mobile Crane near Power Lines

No mobile cranes are to be used near overhead power lines until the Johannesburg Water SOC Ltd representative has been notified and provided safe access conditions and a valid permit to work is obtained. Mobile cranes shall be

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effectively earthed when working in the vicinity of electrical wires. Assume that all electrical equipment and wires are live and avoid them.

Lifting tackle

The following requirements will apply to lifting tackle:

- Manufactured of sound material, well-constructed and free from patent defects;
- Clearly and conspicuously marked with an identity number;
- MML factor of safety:
 - Natural fibre ropes - 10(ten)
 - Man-made fibre ropes and woven webbing - 06(six)
 - Steel wire ropes – single rope - 06(six)
 - Steel wire ropes – combination slings - 08(eight)
 - Mild Steel chains - 05(five)
 - High tensile/alloy steel chains - 04(four)
- Steel wire ropes must be examined by a competent person every three months and the results recorded in a designated logbook. The ropes must be discarded (not used any further for lifting purposes) when wear and corrosion is evident.

20.17 LADDERS

The following requirements for ladders will apply:

- All ladders used on the site shall be constructed and used in compliance with the OH&S Act and Regulations.
- Ladders, which provide access to a working platform, shall extend one metre above the platform where it provides access, and shall be secured to prevent slipping.
- Timber ladders shall not be painted other than with clear preserving oils, clear varnishes or clear plastics.
- Ladders, which are in a damaged condition, shall not be used and shall be labelled accordingly and removed from the Premises.
- All Ladders shall be numbered, logged in a register, and inspected monthly.
- A ladder in use shall be held by an assistant and/or properly tied down in position.
- Only ladders that do not conduct electricity shall be used in live electrical sub-stations and switching rooms.
- Ladders shall be removed after use and stored in an appropriate facility as to not expose them unnecessarily to the elements or potential damage by surrounding activities.

20.18 CONSTRUCTION VEHICLES AND MOBILE PLANT

Johannesburg Water SOC Ltd will inspect construction vehicles and mobile plant prior to being allowed on a project site. Suppliers of hired vehicles, plant and equipment will be required to comply with this specification as well as the Occupational Health and Safety Act (Act no. 85 of 1993) and Regulations.

Construction vehicles and mobile plant to be:

- Of acceptable design and construction;
- Maintained in good working order;
- Used in accordance with their design and intention for which they were designed;
- Operated and/or driven by trained, competent and authorised operators/drivers. No unauthorised persons are to be allowed to drive construction vehicles and mobile plant;
- Provided with safe and suitable means of access;
- Fitted with adequate signalling devices to make movement safe including reversing;
- Provided with roll-over protection (where applicable);
- Inspected daily before start-up by the driver, operator and/or user and the findings recorded in a register/log book;

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- Fitted with two head and two tail lights that are in good working condition and must be used whilst operating under poor visibility conditions;
- When used for transporting persons must have seats firmly secured and sufficient for the number of persons being transported.

Operators and drivers of construction vehicles and mobile plant must be in possession of a valid medical certificate declaring the operator and/or driver physically and psychologically fit to operate or drive construction vehicles and mobile plant.

No loose tools, materials etc. are allowed in the driver and/or operators compartment/cabin or in the compartment in which any other persons are transported.

No person shall ride on any construction vehicle or mobile plant otherwise than in a safe place provided thereon for that purpose. Employees shall only be transported if provision for seating and safety belts has been provided with an adequate canopy or rollover protection.

All construction vehicles and mobile plant left unattended at night, adjacent to a freeway in normal use or adjacent to construction areas where work is in progress, must have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, in order to identify the location of the vehicles or plant.

Bulldozers, scrapers, loaders, and other similar mobile plant must, when being repaired or when not in use, be fully lowered or blocked with controls in a neutral position, motors stopped and brakes set.

Self-Propelled Mobile Machinery

All Self-Propelled Mobile Machinery must be inspected daily and the findings recorded in a register. Pre-use inspection checklist shall identify critical items that would stop the operator from operating machinery should a defect be detected.

All operators shall be tested on their ability to operate machinery and equipment inspected prior to be used on any of the premises by the Johannesburg Water SOC Ltd Project Inspectors and Responsible Engineer. Relief drivers shall be made available for mobile machinery where there is a need for on-going operations and the contractor shall establish a rotation schedule.

All Drivers/Operators shall be appointed under the applicable legislation prior to operating any type of mobile equipment or machinery:

- If Driver/Operator does not adhere to the rules and regulations his appointment as operator shall be cancelled and he shall not be able to carry on with his duty.
- No Driver/Operator shall be appointed without proof of training, driver's licence or letter of competency.
- No training of Drivers/Operators on Site.
- No passengers on dump truck, Loaders or Excavators.
- No eating or drinking allowed while operating equipment.
- No vehicle shall be left unattended with engine running or key in ignition.
- Drivers may use no cellular phones during operations.

Equipment Approval

Authorization for the use of equipment shall be given in writing only after the following minimum requirements and documentation have been verified and shall as a minimum include the following:

- Minimum two lights in front and rear of vehicle
- Communications system (where required);
- Reflective Taping;
- First-aid kit, fire-fighting equipment and emergency roadside triangles;
- Tyres in good condition;
- Windscreen clear of cracks;
- Safety belts fitted for all occupants;

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- Signage for clear identification;
- Windscreen wipers;
- Warning hooter and reverse alarm;
- Rotating warning lights (where applicable);
- Maximum number of persons indicated;
- Equipment free of oil and other leaks;
- Maintenance/Service & Equipment manuals available;

Operator Approval

Authorization for operators for the use of equipment shall be given in writing only after the following minimum requirements and documentation have been verified and shall as a minimum include the following:

- Operator's Certificate (accredited training organisation);
- Operators Licence appropriate to the nature of the Mobile equipment;
- Operator's knowledge tested and familiar with the controls for the vehicle;
- Public driver's permit where required;
- Medical fitness certificate.

20.19 Fall protection (Working in elevated positions)

A pre-emptive risk assessment will be required for any work to be carried out above **two metres** from the ground or any floor level. This work will be classified as "work in elevated positions".

As far as is practicable, any person working in an elevated position will work from a platform, ladder or other device that is at least as safe as if he is working at ground level. Whilst working in this position he shall be wearing a single belt with lanyard to prevent the person falling from the platform, ladder or other device. This safety belt will be, as far as is possible, secured to a point away from the edge over which the person might fall and the lanyard must be of such a length and strength that the person will not be able to move over the edge.

Alternatively, any platform, slab, deck or surface forming an edge over which a person may fall may be fitted with suitable guard rails at two different heights as prescribed in the relevant South African National Standard for the design, erection, use and inspection of access scaffolding.

Where the requirement in the paragraph above is not practicable, the person will be provided with a full body harness that will be worn at all times and shall be attached above the wearer's head at all times. The lanyard must be fitted with a shock-absorbing device or the person must be attached to a fall arrest system (anchorage connector; body wear; and connecting device) approved by Johannesburg Water SOC Ltd.

Where the requirements in the paragraph above are not practicable, a suitable catch net must be erected.

Employees working in elevated positions must be trained to work without risk to their health and safety or to the health and safety of others and be declared medically and psychologically fit to perform work at elevated positions. Where work on roofs is carried out, the risk assessment must take into account the possibility of persons falling through fragile material, i.e. skylights and openings in the roof.

Access scaffolding

Access scaffolding must be erected, used and maintained safely in accordance with Construction Regulations and relevant SA Bureau of Standards Code of Practice.

Detailed consideration must be given to all scaffolding to ensure that it is properly planned to meet the working requirements, designed to carry the necessary loadings and maintained in a sound condition. Sufficient material must be available to erect the scaffolding properly.

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Scaffolding must only be erected, altered or dismantled by persons who have adequate training and experience and are competent in this type of work and under the continuous supervision of such a person.

20.20 Structures

The Principal Contractor must ensure that:

- Only skilled employees are allowed to erect structures and that the skills of these employees are verified at regular intervals.
- Steps are taken to ensure that no structure becomes unstable or collapses due to construction work being performed on it or in the vicinity of it.
- No structure is overloaded to the extent that it becomes unsafe.
- He has received from the designer the following information:
 - Information on known or anticipated hazards relating to the construction work and the relevant information required for the safe execution of the construction work.
 - A geo-scientific report (where applicable).
 - The loading the structure is designed to bear.
 - The methods and sequence of the construction process.

All drawings relating to the design are on site and available for inspection.

20.21 Explosive powered tools

Every explosive powered tool must be:

- Provided with a guard around the muzzle to confine flying fragments or particles; and
- Must be fitted with a firing mechanism that will prevent the explosive powered tool from firing unless it is pushed against the surface and at the right angle. Where the explosive powered tool is fitted with an intermediate piston between the charge and the nail this requirement is waived.

The Principal Contractor or user must ensure that:

- Only the correct type of cartridge is used;
- The explosive powered tool is cleaned and inspected daily before use by an appointed competent person. The competent person will keep a register with the findings of his inspection and the details of cleaning, service and repairs;
- The safety devices are in good working order before the explosive powered tool is used;
- When the explosive powered tool is not being used it is stored in an unloaded condition together with the cartridges in a safe and secure place inaccessible to unauthorised persons;
- A warning notice is displayed at the point where the explosive powered tool is in use;
- The issue and return of cartridges must be by issue/returns register signed by both issuer and user and empty cartridge cases must be returned with unspent cartridges;
- Users and operators of the explosive powered tool have received the necessary training and has been authorised as competent to use/operate the explosive powered tool; and
- Users and operators must wear the prescribed personal protective equipment whilst using and/or operating the tool.

20.22 Bulk mixing plants (Batch plants)

- All contractors shall ensure that all bulk mixing plants are operated and supervised by a competent person who has been appointed in writing.
- All contractors shall ensure that the placement and erection of a bulk mixing plant complies with the requirements set out by the manufacturer and that such plant is erected as designed.
- All contractors shall ensure that all devices to start and stop a bulk mixing plant are provided and that these devices are:

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- Placed in an easily accessible position; and
- Constructed in such a manner as to prevent accidental starting.
- The contractor shall ensure that the machinery and plant selected is suitable for the task and that all dangerous moving parts of a mixer are placed beyond the reach of persons by means of doors, covers or other similar means.
- No person shall be permitted to remove or modify any guard or safety equipment relating to a bulk mixing plant, unless authorized to do so by the appointed person.
- The contractor shall ensure that all persons authorized to operate the bulk mixing plant are fully aware of all the dangers involved in the operation thereof and conversant with the precautionary measures to be taken in the interest of health and safety.
- No person supervising or operating a bulk mixing plant shall authorize any other person to operate the plant, unless such person is competent to operate machinery.
- The contractor shall ensure that all precautionary measures as stipulated for confined spaces in "good safe practices" are adhered to when entering any silo.
- The contractor shall ensure that a record is kept of any repairs or maintenance to a bulk mixing plant and that it is made available, on site, to an inspector, client, client's agent or employee upon request.
- The contractor shall ensure that all lifting machines and lifting tackle used in the operation of a bulk mixing plant complies with the requirements of the Regulations promulgated.
- The contractor shall ensure that all precautionary measures are adhered to regarding the usage of electrical equipment in explosive atmospheres, when entering a silo, as contemplated in the Regulations.

20.23 Working in proximity to Eskom power lines

- No mechanical equipment, including mechanical excavators, may be used under or in close proximity to Eskom's services without the prior approval of Eskom's authorized representatives. No excavations may be executed closer than 3 meters from any of Eskom underground electric power cables and 10 meters from Eskom overhead electrical power lines unless Eskom authorized representative is on site.
- No excavations may take place closer than 5m from any overhead line infrastructure (poles and stays and only excavation by hand will be allowed. Only excavation by hand will be allowed on the same route and in close proximity to the Eskom's 132 kV cables.
- The use of explosives of any type within 500 meters of Eskom's services shall only occur with Eskom's previous written permission. If such permission is granted the applicant must give at least fourteen working days prior notice of the commencement of blasting. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued in terms of the blasting process.
- The contractor shall be liable for any death or injury to any person or for the loss of or damage to any property caused in whatsoever manner by the contractor, his employees, agents or sub-contractors. The contractor's attention is drawn to section 27(3) of the Electricity Act 1987.
- The contractor is advised to negotiate a proper route with the CNC (Customer Network Centre. Lat Long co-ordinates of all proposed routes to be provided on site and during the application process. The contractor is required to provide the same to the CNC on site during the signing of the Stakeholder On-Site Risk Identification Form.
- Parallel encroachment into overhead power line servitudes is limited to one meter from the boundary of the servitude. (Where applicable for underground pipelines only.)
- All Eskom servitudes to be kept clear of any obstacles and other services. No dumping, manholes and illegal structures whether occupied by equipment or humans, shall be allowed directly underneath or within Eskom servitude areas.
- Eskom Overhead Lines, Cables and Eskom Plant to be adequately protected against other services and water sources.
- Adequate protection fence should be installed around all Eskom Overhead Structures. The type of fence will be proposed and approved by Eskom CNC / Engineering as listed above.

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- Interlocking bricks to be used along all roads and reserves as to ensure Eskom cables could be easily accessed for maintenance and repair / emergency purposes. No roads should be tarred with Eskom cables within the road.
- For developer projects and other works that might affect access to Eskom mini-sub, an appropriate fence with access / gate as approved by the CNC should be installed on street front side.
- The applicant shall ensure that the existing natural ground level is maintained within the Eskom servitude area and where Eskom cables are affected. Should there be a need for the lifting of lines and / or replacement of existing structures / cables and application should be made via **Eskom Customer Services**.
- The vertical clearance required between the road surface and the 11kV / 22kV power-lines shall be at least 6.4m. (Where applicable.)
- Eskom Plant and Cables to be protected from proposed landscaping i.e. no big trees and large plants / scrubs (large roots) to be planted in close proximity to Eskom services.
- Construction / Amendment of boundary wall/s / fences to be closely monitored with guidance from the CNC – where walls / fences are in close proximity of Eskom Plant.
- At all entrances and road crossings, corrosion-free sleeves must be installed at least 600 mm below undisturbed ground level to provide for existing and future installation of Eskom cables. (Where applicable.)
- Cross trenches by hand need to be done for each road crossing on both sides of the road before the services are installed, to ensure Eskom services do not get damaged during drilling operations. For installations where the service will be installed parallel to Eskom services, cross trenches need to be done by hand at regular intervals, which is to be determined by site conditions and the Eskom PPM cables representative.
- The contractor must inform and update Eskom PPM cables on a weekly basis of the on-site work being planned and performed.
- Equipment shall be regarded electrically live and therefore dangerous at all times.
- Eskom may stipulate any additional requirements to illuminate any possible exposure to Customers or Public to coming into contact or be exposed to any dangers of Eskom plant.
- Security must be on-site 24/7 when trenching and working in close proximity to the Eskom 132 kV cables
- Extra care must be taken when working in close proximity to the 132 kV cables. (Eskom's PPM cables can assist in identifying these cables on-site.)
- The contractor in charge of the construction or maintenance work on site must at all times be in possession of the Approved Wayleave letter of the affected Eskom services, as well as all plans related to the wayleave application. This should be available upon the request of any Eskom and Municipal official, during site visits. If no approval is presented, then the Eskom Official(s) can order that all work to be ceased until approval can be presented.

20.24 Horizontal Drilling

- All HDD work shall be carried out under the supervision of a competent person.
- All employees involved in HDD shall be trained.
- A risk assessment as well as a method statement for the HDD shall be compiled and submitted for approval by the Client.
- Contractor will submit specifications on directional boring equipment to be used to ensure that the equipment will be adequate to complete the project. Spares inventory shall be included
- The directional boring equipment shall consist of a directional boring rig of sufficient capacity to perform the bore and pullback the pipe, a boring fluid mixing & delivery system of sufficient capacity to successfully complete the crossing, a guidance system to accurately guide boring operations and trained and competent personnel to operate the system.
- All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project.
- The directional boring machine shall consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guideable drill (bore) head.

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- The machine shall be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the crossing.
- The hydraulic power system shall be self-contained with sufficient pressure and volume to power boring operations.
- Hydraulic system shall be free of leaks.
- Rig shall have a system to monitor and record maximum pull-back pressure during pull-back operations.
- The rig shall be grounded during boring and pull-back operations.
- Sufficient spares shall be kept on hand for any break-downs which can be reasonably anticipated.
- The Guidance System shall be of a proven type and shall be setup and operated by personnel trained and experienced with this system.
- The Operator shall be aware of any magnetic anomalies and shall consider such influences in the operation of the guidance system if using a magnetic system.
- The Engineer must be notified 48 hours in advance of starting work.
- The Directional Bore shall not begin until the Engineer is present at the job site and agrees that proper preparations for the operation have been made.
- The Engineer approval for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work as authorized under the Contract.
- It shall be the responsibility of Engineer to provide inspection personnel at such times as appropriate without causing undue hardship by reason of delay to the Contractor.

20.25 Pipe jacking / tunnelling

- No person may enter a tunnel, which has a height dimension of **less than 800 millimetres**.
- Pipe Jacking shall be supervised and undertaken only by persons fully conversant with this work.
- Pipe Jacking to comply to SANS standards (SPEC 1200 LG-1983), Mine Health and Safety Act. 29 of 1996 and Mineral and Petroleum Resources Development Act (Act 28 of 2002).
- Adequate ventilation and lighting must be provided to employee working inside the tunnel at all times.
- Employees involved in drilling and operation of jackhammers must be provided with ear muffs and shock absorbing gloves
- The launch and reception pits should be properly secured from collapsing, and must be inspected daily by a competent person appointed in writing.
- The working area must be completely fenced off and the pits must be adequately barricaded.
- Where there is presence of groundwater or mud, steel toed gumboots must be provided.
- Employees shall be trained by a competent person on the safe use of the Hydraulic Power pack or winch used to push the pipes
- Hydraulic power packs and winches shall be pressure and load tested and records thereof retained
- Detailed method statements for each area shall be submitted to Johannesburg Water prior to the commencement of the work.
- A calibrated gas tester/ oxygen measuring meter shall at all times be placed at the working area, and employees will be trained on the use thereof
- An adequate emergency procedure must be submitted to Johannesburg Water prior to the commencement of the work.

20.26 WATER ENVIRONMENTS

- The contractor must ensure that where construction work is done over or in close proximity to water, provision is made for—
 - preventing persons from falling into water; and
 - the rescuing of persons in danger of drowning.
- The contractor must ensure that where a person is exposed to the risk of drowning by falling into the water, the person is provided with and wears a lifejacket.

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22. Monthly reporting

- The Principal Contractor is required to provide Johannesburg Water SOC Ltd. with a monthly report in the format provided on the last working day of the month.
- The report will include the monthly man-hours, incidents, training, inductions, audits, etc

23. Project close out

- Upon completion of the project, the contractor is required to hand over a consolidated project file to the Client with all the working documents for retention.

	OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION	
	PROJECT NUMBER:	JW 14301R
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Returnable Annexure A: Acknowledgement of SHE Specification & Annexures

CONTRACTOR:	

I, the undersigned, hereby acknowledge that I have obtained copies of the following listed documentation and confirm that I fully understand the contents thereof and the consequences of non-compliance. The Contractor furthermore reiterates its commitment to compliance of the requirements contained within the following provided documentation:

- Johannesburg Water SOC Ltd, Occupational Health and Safety Specification, Volume 2;
- Annexure 1: Baseline Risk Assessment
- Annexure 2: Medical Screening Policy

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

CONTRACT MANAGER			
NAME	DESIGNATION	DATE	SIGNATURE
CONTRACT SUPERVISOR			
NAME	DESIGNATION	DATE	SIGNATURE
WITNESS (1)			
NAME	DESIGNATION	DATE	SIGNATURE
WITNESS (2)			
NAME	DESIGNATION	DATE	SIGNATURE



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION

PROJECT NUMBER:	JW 14301R
PROJECT LOCATION:	LINBRO PARK
PROJECT DESCR:	LINBRO WATER UPGRADE

ANNEXURE 1: BASELINE RISK ASSESSMENT



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

PROJECT NUMBER:	JW 14301R
PROJECT LOCATION:	LINBRO PARK
PROJECT DESCR:	LINBRO WATER UPGRADE

BASELINE RISK ASSESSMENT



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

PROJECT NUMBER:	JW 14301R
PROJECT LOCATION:	LINBRO PARK
PROJECT DESCR:	LINBRO WATER UPGRADE

ACTIVITY: TRANSPORTATION OF MATERIALS TO SITE

Task	Hazard	Risk	Consequence	Rating	Controls
Transportation of material to site	✓ Unsafe road conditions ✓ Un-road worthy vehicles ✓ Equipment and material not safely secured ✓ Incompetent drivers ✓ Driving under the influence of alcohol ✓ Inclement weather ✓ Speeding ✓ Slippery road	✓ Overturning vehicles ✓ Vehicle collisions ✓ Bumping pedestrians / employees	✓ Injuries ✓ Property damages ✓ Third party liability	M	✓ Adherence to the speed limit ✓ Only competent/ authorised drivers should operate the vehicle ✓ Inspection of vehicles ✓ Equipment and material to be properly secured ✓ Alcohol testing to be done ✓ The road to be paved to prevent accidents ✓ Traffic control to be implemented to avoid collisions
Offloading of material	✓ Faulty lifting machinery & equipment ✓ Suspended load ✓ Poor housekeeping	✓ Malfunctioning ✓ Falling on employees ✓ Obstructed walkways by materials	✓ Injuries	M	✓ Inspect lifting equipment prior to use. ✓ Ensure the safe working load prior to use ✓ Train the employees in manual lifting ✓ Ensure proper housekeeping ✓ The correct PPE must be worn ✓ Designate the stacking areas and put signs ✓ Stacking and storage inspector must be appointed and in charge



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

PROJECT NUMBER:	JW 14301R
PROJECT LOCATION:	LINBRO PARK
PROJECT DESCR:	LINBRO WATER UPGRADE

ACTIVITY: SITE ESTABLISHMENT

Task	Hazard	Risk	Consequence	Rating	Controls
Site establishment	✓ Sharp objects/ wires ✓ Uneven surface ✓ Faulty connection ✓ Poor ergonomics ✓ Falling objects ✓ Inadequate security services ✓ Not enough welfare facilities e.g. toilets, change rooms and lockers	✓ Cuts ✓ Slips and trips ✓ Damage to services ✓ Using the environment as ablution facilities	✓ Injuries ✓ Back strains and injuries ✓ Crime, theft, fights ✓ Contracting of communicable diseases ✓ Soil, water pollution	M	✓ Supervisors to plan during site set up and induct employees ✓ A competent electrician must be appointed to connect electrical wires to the site offices and Distribution Board. ✓ Ensure there are welfare facilities on site for health and hygiene purposes ✓ Awareness on hygiene and use of ablution facilities ✓ Detailed Risk Assessment must be drawn before any work commences on site.
Installing containers	✓ Using lifting equipment ✓ Faulty equipment ✓ Faulty slings / chains	✓ Wind ✓ Incompetent personnel ✓ Heavy load ✓ Failing of lifting equipment	✓ Serious injuries ✓ Property damage	H	✓ Check wind speed prior to using the crane. ✓ Inspect the crane, slings and chains before use. ✓ Load test the crane before use ✓ Only carry loads certified to be carried by the crane



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

PROJECT NUMBER:	JW 14301R
PROJECT LOCATION:	LINBRO PARK
PROJECT DESCR:	LINBRO WATER UPGRADE

Electrical installation	✓ Electricity ✓ Incompetent personnel ✓ Wrong tools ✓ Damaged cables	✓ Contact with live electricity ✓ Incompetent person connecting electricity ✓ Electric shocks	✓ Electrocution ✓ Serious injuries	H	✓ Follow lock out procedure ✓ Ensure that equipment are earthed to an approved earthing point ✓ Ensure a zero potential test is performed for electricity is isolated ✓ Inspect all tools ✓ Use correct tools for the job ✓ Appoint a competent electrician/ technician ✓ Wear task specific PPE ✓ Ensure that there are no exposed wires on the cables
Entry and exit	✓ No access control	✓ Unauthorised entry into the construction site	✓ Injuries ✓ Theft	M	✓ Appoint a full time, registered security guard on site
Stacking and storage	✓ Unsafe stacks of materials or pallets	✓ Falling of pallets and material on employees	✓ Injuries ✓ Property damage	H	✓ Supervision of all stacking of materials on site ✓ Materials of same base and heights stacked together ✓ Barricade the stacking area ✓ Unsafe stacks to be removed immediately ✓ Never stack materials during knocking off time or late at night ✓ Use task specific PPE



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

PROJECT NUMBER:	JW 14301R
PROJECT LOCATION:	LINBRO PARK
PROJECT DESCR:	LINBRO WATER UPGRADE

ACTIVITY: EXCAVATION

Task	Hazard	Risk	Consequence	Rating	Controls
Excavation	✓ Deep excavations ✓	✓ Collapse ✓ Falling ✓ Unsafe entry and exit	Fatalities	H	✓ Geotechnical surveys to be conducted prior to construction ✓ Shoring of the excavation ✓ No unauthorised entry into the project site. ✓ Fencing off of the excavation and prompt supervision of the area. ✓ Full time security on site to monitor entry and exit. ✓ Safe method of entry and exit to be provided for employees ✓ Spoil material to be stored at least 2m away from the excavation ✓ Signage to be displayed indicating deep excavations
	✓ Incompetent operator ✓ Faulty excavator	✓ Overturning ✓ Bumping against people	✓ Serious injuries	H	✓ Only competent personnel may operate the excavator ✓ All excavators must be inspected prior to use



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

PROJECT NUMBER:	JW 14301R
PROJECT LOCATION:	LINBRO PARK
PROJECT DESCR:	LINBRO WATER UPGRADE

ACTIVITY: EXCAVATION

Task	Hazard	Risk	Consequence	Rating	Controls
Mechanical excavation	✓ Ignition on	✓ Accidental movement	✓ Fatalities ✓ Property damages	H	✓ Operators should ensure that the ignition is off prior to leaving the plant. ✓ Keys should be removed from the ignition and returned to the office for safekeeping,
Deep excavation	✓ Lack of safety signage	✓ Employees falling into excavations	✓ Fatalities	H	✓ Ensure that deep excavation signage is placed and visible. ✓ Deep excavations must be fenced off and access controlled.
	✓ Spoil material	✓ Collapse of excavation walls. ✓ Entrapment	✓ Fatalities	H	✓ Excavated soil to be placed at least 2m away from the excavation wall.
	✓ Underground service	✓ Contact with plant	✓ Injuries ✓ Property damages ✓ Electrocution	H	✓ All underground services to be identified and marked prior to excavation.
	✓ Unsafe access and exit	✓ Falling	✓ Injuries	H	✓ TLB / Excavator may not be used by employees to access and exit the excavation



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

PROJECT NUMBER:	JW 14301R
PROJECT LOCATION:	LINBRO PARK
PROJECT DESCR:	LINBRO WATER UPGRADE

ACTIVITY: MECHANICAL LIFTING

Task	Hazard	Risk	Consequence	Rating	Controls
Lifting using a crane	✓ Overhead lines	✓ Contact with crane	✓ Electrocution ✓ Property damages	H	✓ All lifting activities to be planned at least 2m away from overhead lines ✓ Obtain wayleaves from Eskom ✓ Appoint ORHVS
	✓ Wind / Unfavourable weather	✓ Deflection ✓ Loss of control	✓ Injuries ✓ Property damages	H	✓ Do not use during unfavourable weather conditions
	✓ Incompetent operator	✓ Loss of control ✓ Hitting structures and people	✓ Injuries ✓ Property damages	H	✓ Only trained and competent operators may operate the crane
	✓ Overloading	✓ Collapse of material	✓ Injuries ✓ Property damages	H	✓ Display safe working load on the crane
	✓ Faulty crane	✓ Malfunctioning	✓ Injuries ✓ Property damages	H	✓ Cranes to be inspected by competent persons prior to being used ✓ All faulty cranes to be tagged and locked out



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

PROJECT NUMBER:	JW 14301R
PROJECT LOCATION:	LINBRO PARK
PROJECT DESCR:	LINBRO WATER UPGRADE

ACTIVITY: WORKING AT HEIGHTS

Task	Hazard	Risk	Consequence	Rating	Controls
Working at heights	✓ Heights ✓ Unfit employees ✓ Using hand tools ✓ Unsecured tools and equipment	✓ Falls ✓ Falling onto employees	✓ Injuries	M	✓ Employees to use proper PPE including safety harnesses when working at heights. ✓ Inspect all tools prior to use. ✓ Provide training for using safety harnesses correctly. ✓ Employees working at heights must be certified fit to work. ✓ Hand tools must be attached to lanyards when working at heights. ✓ Use tool bags ✓ Use netting system below each level. ✓ No work should be done on the ground when work at heights is in progress. ✓ Proper signage to be displayed.



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

PROJECT NUMBER:	JW 14301R
PROJECT LOCATION:	LINBRO PARK
PROJECT DESCR:	LINBRO WATER UPGRADE

ACTIVITY: PIPE JACKING

Task	Hazard	Risk	Consequence	Rating	Controls
✓ Pipe jacking	✓ Working in confined spaces	✓ Lack of oxygen ✓ Harmful gases ✓ Entrapment	✓ Asphyxiation ✓ Serious injuries ✓ Fatalities	H	✓ Develop a confined space procedure. ✓ Develop a permit to work system. ✓ Only authorized and trained personnel to enter confined spaces. ✓ Ensure that the gases are purged before entry. ✓ Provide employee with oxygen mask ✓ Have an employee trained in first aid ready. ✓ Confined space may not be smaller than 800mm in diameter.
	✓ Working at heights	✓ Falling	✓ Fatalities ✓ Serious injuries	H	✓ Proper PPE to be issued ✓ Provide rigid edge protection.
	✓ Lifting operations	✓ People hit by load ✓ Collapsing of pipe ✓ Incorrect slinging	✓ Injuries	M	✓ No people are allowed to be at the jacking site. ✓ Slinger to be identifiable and wear reflective PPE. ✓ Lifting machinery to be inspected prior to use. ✓ Lifting machinery to be load tested.
	✓ Deep excavation	✓ Falling	✓ Fatalities	H	✓ Barricade the jacking pit ✓ No unauthorized entry ✓ Site should be fenced off and locked out. ✓ Signage should be put up
	✓ Jetting rig	✓ Crushing by horizontal move of the rig; ✓ People hit by drop load	✓ Injuries	M	✓ Enter the shaft only once the load has reached the bottom. ✓ Signaler to make the people in the shaft aware of the moving load.



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

PROJECT NUMBER:	JW 14301R
PROJECT LOCATION:	LINBRO PARK
PROJECT DESCR:	LINBRO WATER UPGRADE

ACTIVITY: PIPE LAYING & WELDING

Task	Hazard	Risk	Consequence	Rating	Controls
Pipe laying	✓ Steel ✓ Employees working around the excavation	✓ Static electricity ✓ Rough edges ✓ Heavy steel ✓ Hit by pipe	✓ Electrocution ✓ Injuries	M	✓ Ensure that pipes are earthed ✓ Provide gloves to employees ✓ Heavy pipes to be lifted mechanically
Pipe laying	✓ Crane	✓ Failure of the crane ✓ Employees	✓ Fatalities	H	✓ Inspect the crane prior to use. ✓ Only trained and competent person to operate the crane ✓ Employees to steer clear of lifting operations ✓ Faulty cranes to be tagged and not used ✓ Wind speed and direction to be considered before using the crane ✓ Crane to be load tested ✓ Only certified loads to be carried on the crane
Tie ins & pressure testing	✓ Pressurized water	✓ Hitting employees ✓ Burst	✓ Fatalities ✓ High water losses	E	✓ Ensure that the water is shut down ✓ Ensure that the correct class of pipe is used as well as valve specifications are correct ✓ Develop and follow a method statement ✓ Use only competent person to perform the task. ✓ Don't exceed pipe operating pressure, ensure pipe is correct diameter and is not damaged.



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

PROJECT NUMBER:	JW 14301R
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ACTIVITY: PIPE LAYING & WELDING

Task	✓ Hazard	✓ Risk	✓ Consequence	Rating	✓ Controls
Pipe welding	✓ Welding equipment	✓ Poor maintenance	✓ Injuries	M	✓ Welding equipment is visually checked before each use;
	✓ Welding	✓ Sparks	✓ Fire	H	✓ Welding screens to be used
		✓ Sparks	✓ Burns	L	✓ Fire resistant overalls and apron to be worn. ✓ Develop method statement for welding inside the pipe
		✓ Glare	✓ Arc eyes	M	✓ Welding glasses to be used
	✓ Confined space	✓ Entrapment ✓ Inability to move	✓ Injuries ✓ Suffocation	H	✓ Develop method statement for welding inside the pipe. ✓ Ensure that the welder is able to fit in properly inside the pipe and move with ease ✓ Use a different method of welding where the pipe's internal diameter is less than 800mm.
Compacting	✓ Compactor ✓ Noise ✓ Dust ✓ Vibration	✓ In-competent employee using the compactor ✓ Hearing loss ✓ Hand-arm vibration syndrome ✓ Collapsing excavation wall ✓ Inhalation of dust	✓ Injuries Respiratory problems	M	✓ Use of earmuffs by compactor operator ✓ Dust mask to be worn by compactor operator ✓ Compactor operator to be declared competent before using the machine



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PROJECT NUMBER:	JW 14301R
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ACTIVITY: MECHANICAL WORKS

Task	Hazard	Risk	Consequence	Rating	Controls
Installation of pumps and valves	Heavy pumps and valves	Falling	✓ Injuries ✓ Property damages	M	✓ Use proper lifting equipment ✓ Ensure that only the relevant people are in the work area. ✓ Ensure that lifting equipment is load tested. ✓ Only competent personnel to undertake this task
	Steel fixing	✓ Falling ✓ Slip	Injuries	L	✓ PPE, including safety boots and goggles must be used
Cutting and drilling	✓ Drilling ✓ Drill bit ✓ Drill sharp metal fibres ✓ High Noise Levels ✓ Cutting Grinder/Disc	✓ Vibration ✓ Cutting edges ✓ Eye penetration ✓ Finger cuts ✓ Expose to high noise level area ✓ Uncontrolled disc ✓ Electrical equipment failure ✓ Sharp window edges	✓ Damaged hearing ✓ Carpal tunnel syndrome ✓ Cuts/ injuries ✓ Eye irritation / blindness ✓ Injuries ✓ Eye injuries	M	✓ Use hearing protection when exposed to excessive noise levels (greater than 85 dB over an 8-hour work period) ✓ Assess noise level with sound level meter if possibility exists that level may exceed 85dB. ✓ Rotate drilling tasks to minimize worker exposure to equipment vibration. ✓ Use right size of a drill to drill different layers of the ground



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ACTIVITY: MECHANICAL WORKS

Task	Hazard	Risk	Consequence	Rating	Controls
					✓ Assess manual guide carefully to ensure correct usage of portable electrical devices.
Welding	✓ Fumes	✓ Inhalation	✓ Respiratory problems	M	✓ Wear respiratory protection
	✓ Sparks	✓ Contact with skin	✓ Skin burns	L	✓ Personal Protective Equipment to include face, eye and skin protection
	✓ Sparks	✓ Fire	✓ Damage to property ✓ Fatalities	H	✓ Provide fire extinguisher ✓ Provide screens ✓ Remove all sources of combustion and hazardous chemicals from welding area
	✓ Welding arc	✓ Starring welding arc	✓ Eye irritation	L	✓ Safety goggles to be worn
Install generator	✓ Lifting equipment	✓ No SWL displayed ✓ Faulty equipment ✓ Employees standing around	✓ Serious injuries ✓ Property damages	M	✓ Load testing of lifting equipment ✓ Inspection of lifting tackle and equipment prior to use ✓ Display SWL ✓ Only competent people to operate the lifting equipment ✓ Access control to the lifting area



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ACTIVITY: MECHANICAL WORKS

Task	Hazard	Risk	Consequence	Rating	Controls
Fueling the generator	✓ Spillages	✓ Slips, trips, falls	✓ Injuries	L	✓ Prevent spillages ✓ Use drip trays ✓ Use funnels for fueling
		✓ Fire	✓ Injuries	M	✓ No smoking allowed near the generator
	✓ Diesel fumes	✓ Inhalation	✓ Respiratory problems	L	✓ Provide employees with respirators
		✓ Skin contact	✓ Skin irritation	L	✓ Provide employees with gloves, safety boots and overalls
	✓ Running engine	✓ Explosion	✓ Injuries	M	✓ Switch engine off before refueling and make sure fuel cap is replaced. ✓ No smoking allowed near the generator
Running the engine	✓ Noise	✓ Over-exposure	✓ Noise-induced hearing loss	M	✓ Provide employees with hearing protection ✓ Provide rest periods for employees



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ACTIVITY: MECHANICAL WORKS

Task	Hazard	Risk	Consequence	Rating	Controls
	✓ Vibration	✓ Over exposure	✓ Raynaud's Syndrome	L	✓ Provide employees with vibration gloves. ✓ Rotate employees or provide rest periods.
	✓ Fumes	✓ Inhalation	✓ Respiratory problems	L	✓ Provide employees with respirators ✓ Never use indoors



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

PROJECT NUMBER:	JW 14301R
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PROJECT DESCR:	LINBRO WATER UPGRADE

ACTIVITY: GENERAL ACTIVITIES ON SITE

Task	Hazard	Risk	Consequence	Rating	Controls
Traffic Management	✓ Moving vehicles and pedestrians ✓ Improperly placed signage ✓ Incorrect signage displayed ✓ Poor communication between flagmen	✓ Road accidents ✓ People getting knocked down by cars	✓ Fatalities ✓ Serious injuries ✓ Property damages	H	✓ Adhere to traffic management procedures ✓ Ensure good communication between flagmen ✓ Display correct road signage ✓ Employees should wear reflective PPE ✓ Keep area clean & clear of obstacles.
Reinstatement	✓ Inadequate compaction ✓ Construction refuse ✓ Inadequate re-surfacing High ✓ Ground collapse ✓ Hydraulic / pneumatic pressures	✓ Uneven surfaces	✓ Injuries	L	✓ Compaction to specified standard. ✓ Site cleared of debris and refuse. ✓ Re-surface appropriately. ✓ Do not leave gaps in turf or leave uneven surface. ✓ Erect fence around hazardous areas until restored and safe. ✓ Ensure plugs and compressors are installed and secured against movement. ✓ Release air before removing plugs. ✓ Clear area of pipe ends being tested.
					✓



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

PROJECT NUMBER:	JW 14301R
PROJECT LOCATION:	LINBRO PARK
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ACTIVITY: GENERAL ACTIVITIES ON SITE

Task	Hazard	Risk	Consequence	Rating	Controls
✓ Working on site	✓ Unhappy community ✓ Criminals	✓ Community coming to site ✓ Violence against employees	✓ Property damages ✓ Serious injuries	H	✓ Develop an emergency response procedure ✓ Meet with the community and all stakeholders prior to commencement of the project ✓ Keep all gates locked at all times ✓ Have the contact details of the nearest police station / JMPD offices ✓ Liaise with CLO, ward governance and councilor ✓ Stop work and evacuate employees where possible ✓ Have 24/7 security on site
	✓ Unfavourable weather conditions	✓ Exposure to temperature extremes	✓ Heat exhaustion ✓ Frost bite	M	✓ Provide employees with water for cooling down. ✓ Provide employees with warm jackets during winter and gloves ✓ Provide 5-minute rest periods for every 30 minutes of exposure to temperature extremes.
	✓ Housekeeping	✓ Trips and falls	✓ Injuries	M	✓ Ensure that proper housekeeping is maintained on site at all times.
Storage of HCS	✓ Burning or fires on site ✓ Improper labelling of chemical containers	✓ Property damage ✓ Accidental consumption of flammable liquids	✓ Serious injuries ✓ Illnesses	M	✓ A well ventilated cage may be used for storage of all the HCS and flammables ✓ HCS supervisor must record all quantities on a register. ✓ Label containers correctly ✓ Display HCS signage
					✓



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

PROJECT NUMBER:	JW 14301R
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RISK ASSESSMENT MATRIX

Likelihood	Consequences				
	Insignificant (minor problem easily handled by normal day to day processes)	Minor (Some disruption possible e.g., damage equal to R150k)	Moderate (significant time / resources required. E.g., damage equal to R500k)	Major (Operations severely damaged. E.g., damages equal to R1m)	Catastrophic (business survival is at risk. Damage equal to R5m – 10m)
Almost certain (90% chance)	High	High	Extreme	Extreme	Extreme
Likely (between 50-90%)	Moderate	High	High	Extreme	Extreme
Moderate (between 10-50%)	Low	Moderate	High	Extreme	Extreme
Unlikely (between 3-10%)	Low	Low	Moderate	High	Extreme
Rare (<3%)	Low	Low	Moderate	High	High



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION

PROJECT NUMBER:	JW 14301R
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ANNEXURE 2: MEDICAL SCREENING POLICY

JOHANNESBURG WATER (SOC) LTD

MEDICAL SCREENING POLICY

JW 14301R: LINBRO WATER UPGRADE

NOTICE

It is the Contractor's responsibility to ensure that medical surveillance requirements specified in the Occupational Health and Safety Act (85/1993) and Regulations and any other applicable legal and Johannesburg Water's requirements are fully complied with.

This document is meant to facilitate the Contractor's compliance to applicable requirements and does not replace the applicable legal requirements.

This document may be revised at any time to include applicable legal requirements not currently included that may come to the attention of Johannesburg Water in future. The Contractor will accordingly be responsible to comply with the revised requirements as might be necessary.

Where methods to ensure legal compliance have been specified in this document, Contractors may submit alternative detailed method statements for consideration and approval by Johannesburg Water. Johannesburg Water may, at its sole discretion, reject or accept such alternative methods.

1 PURPOSE OF THE MEDICAL SURVEILLANCE REQUIREMENTS PROCEDURE

The purpose of this Medical Surveillance Requirements Procedure is to facilitate the achievement of legal compliance relating to medical surveillance by all Consultants, Contractors, Subcontractors and suppliers that will be working on the Johannesburg Water project and to ensure that employees are fit to work in the roles that they have been employed to execute and remain so for their duration on the project site.

This document represents the minimum requirements for medical surveillance and does not replace applicable legal requirements.

2 MEDICAL SURVEILLANCE OBJECTIVES

The Johannesburg Water main objectives for medical surveillance are:

- a) To ensure compliance with all applicable medical surveillance legal requirements.
- b) To ensure compliance with all Johannesburg Water's requirements regarding medical surveillance.
- c) To ensure that employees are fit to execute the work for which they have been employed.
- d) To prevent employees from acquiring occupational diseases or illnesses.
- e) To ensure early detection and treatment of occupational diseases and to prevent the aggravation of existing medical conditions.
- f) To ensure that employees on departure from the project have not contracted any occupational diseases and to enable any such condition that arises to be suitably addressed.

All contractors are required to demonstrate total commitment towards the achievement of these objectives.

3 GENERAL REQUIREMENTS

- 3.1 The Principal Contractor shall ensure that a medical surveillance programme is implemented for all employees.
- 3.2 An initial health evaluation shall be carried out by an occupational health practitioner immediately after a person commences employment, where any exposure exists or may exist, which comprises:
- an evaluation of the employees medical and occupational history;
 - a physical examination; and
 - any other essential examination which in the opinion of the occupational health practitioner is desirable in order to enable the practitioner to do a proper evaluation.
- 3.3 Medical surveillance & Immunization shall be done accredited institutions or occupational health doctor, including, but not limited to:
- a) Audiograms.
 - b) A cardio-respiratory examination, including full size chest x-rays (If lung function tests are abnormal)
 - c) Lung function tests.
 - d) Eye/ sight tests.
 - e) A general physical examination.
 - f) A review of previous medical history.
 - g) Blood pressure tests
 - h) Glucose tests
 - i) Vaccination (Hepatitis A & Typhoid)

Copies of all medical certificates shall be submitted to the Johannesburg Water Project Specialist or Appointed OHS Agent to prior to site establishment and before an employee is allowed to come onto site.

Specific attention shall be given to the physical and psychological fitness of people who will be required to work in elevated positions and operators of mobile machinery.

An exit medical certificate shall be obtained for all workers at the end of the contract and for all ~~workers who leave the employment of the Contractor before the end of the Project. Copies of all~~

exit medical certificates shall be submitted to the Johannesburg Water Project Specialist or Appointed OHS Agent.

Medical surveillance shall address all occupational health risks to which the employee is exposed, identified through the risk assessment referred to in section 4 below.

Retention monies will be withheld if the exit medical is not complete for all employees.

The cost of all medical examinations will be borne by the Contractor as provision is made on the bill of quantities.

4 OCCUPATIONAL HEALTH RISK ASSESSMENT

4.1 The Contractor shall conduct an occupational health risk assessment prior to site establishment.

4.2 The Contractor shall ensure that, as far as is reasonably practicable, ergonomic related hazards are analyzed, evaluated and addressed in the risk assessment.

4.3 The methodology used by the contractor to assess occupational health risks associated with their activities shall be submitted to Johannesburg Water for approval by the Johannesburg Water Project Specialist or Appointed OHS Agent prior to site establishment. The methodology should take the following into consideration, among others:

- a) Legal requirements.
- b) Normal activities undertaken by the contractor.
- c) Abnormal situations (e.g. unanticipated breakdown of equipment etc).
- d) Emergency situations (e.g. fires, exposure to chemicals).
- e) Changes in work procedures and methods.
- f) Previous experience.

4.4 A risk register that will include the following shall be submitted to the Johannesburg Water Project Specialist or Appointed OHS Agent before site establishment.

a) All occupational health risks identified during the occupational health risk assessment.

~~b) A list of the occupational health risks that have been identified as being significant.~~

- c) Reference to the method statements, measures or procedures that will be followed to either eliminate or reduce the significant risks to tolerable levels.

4.5 The Contractor shall, in writing, clearly explain how each occupational health risk assessed to be significant will be addressed to eliminate or reduce it to a tolerable level and submit it for approval by the Johannesburg Water Project Specialist or Appointed OHS Agent before site establishment. This may be through method statements or written operational control procedures. Associated responsibilities and authorities shall be clearly defined. All method statements shall reflect at least:

- a) When the activities relating to the method statement will be conducted (timing).
- b) Materials to be used.
- c) Equipment and staffing requirements.
- d) The proposed construction procedure designed to implement the relevant requirements.
- e) The system to be implemented to ensure compliance with the method statement.
- f) Any other information deemed to be necessary by the Johannesburg Water Project Specialist or Appointed OHS Agent and/or the contractor's responsible person.

4.6 For significant occupational health risks identified after site establishment, method statements shall be submitted to the Johannesburg Water Project Specialist or Appointed OHS Agent at least 10 working days before the start of the associated activity, when possible.

4.7 All changes to approved method statements or procedures shall be approved in writing by the Johannesburg Water Project Specialist or Appointed OHS Agent.

4.8 The contractor's Responsible Person shall retain records of any amendments and shall ensure that only the most current approved version of any method statement or procedure is used.

4.9 Every occupational health risk that is identified during the risk assessment process shall be conveyed to every employee whose work is associated with the risk. This may be done in the form of a toolbox talk but does not replace the toolbox talk entirely. Each employee shall sign to confirm an understanding of the occupational health risks in the tasks.

- 4.10 Occupational health risk assessments may be combined with safety and environmental risk assessments, but the consideration of occupational health issues shall be clearly reflected in the records generated and maintained.
- 4.11 The occupational health risk assessment process and effective implementation of measures to eliminate or reduce identified risks is the responsibility of the Contractor. Johannesburg Water will closely monitor the effectiveness of implemented measures.

Acknowledgement of JW Medical Screening Policy

Name of Contractor

.....

I, the undersigned, hereby acknowledge that I have obtained copies of JW Medical Screening Policy and confirm that I fully understand them and the consequences of non-compliance.

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

Signature of Contractor / Mandatory

Date

.....

.....

Signature of 16.2 / Construction Manager

Date

.....

.....

Witness 1

Witness 2



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION

PROJECT NUMBER:	JW 14301R
PROJECT LOCATION:	LINBRO PARK
PROJECT DESCR:	LINBRO WATER UPGRADE

ANNEXURE 3: SIGN OFF FORM

OHS CONTRACTORS' MANAGEMENT SYSTEM					
TENDER DOCUMENT SHE SPECS SIGN-OFF FORM					
REQUESTED BY	Nsuku Shibambu	DATE	02/07/2024	JW 14301R	
JW 14301R: LINBRO WATER UPGRADE					
LIST OF SHE SYSTEM ATTACHED TO THE TENDER DOCUMENT					
SHE SYSTEM ATTACHED	Y/N	VERSION	NO PAGES	REMARKS	
Volume 3 SHE Specification & Acknowledgement Form	Y	V2 – 05/15	46	For info	
Baseline Risk Assessment	Y	V01 – 05/15	18	For info	
Medical Screening Policy	Y	V01 – 05/15	8	For info	
Returnable Annexure A	Y	V02 - 02/20	1	Return with tender document	
Page 1 of 1					



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION

PROJECT NUMBER:	JW 14301R
PROJECT LOCATION:	LINBRO PARK
PROJECT DESCR:	LINBRO WATER UPGRADE

ANNEXURE 4: ENVIRONMENTAL MANAGEMENT PLAN



ENVIRONMENTAL MANAGEMENT PLAN

JOHANNESBURG WATER SOC LTD

ENVIRONMENTAL MANAGEMENT PLAN

REVISION:05

Prepared By:
OHSE & DM
Environmental Management Section

Johannesburg Water SOC (Ltd)

PO Box 61542

Marshalltown

2001

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- Annexure B:** Contractors Environmental File Evaluation Form
- Annexure C:** Environmental Work Instruction
- Annexure D:** Johannesburg Water General Surface Rehabilitation Specification

LIST OF ACRONYMS Acronym Description

BA	Basic Assessment
BAR	Basic Assessment Report
CA	Competent Authority

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DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EO	Environmental Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme Report
GDARD	Gauteng Department of Agriculture and Rural Development
GN	Government Notice
I&AP	Interested and Affected Party
JW	Johannesburg Water
km	Kilometre
m	meter
MSDS	Material Safety Data Sheets
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PHRAG	Provincial Heritage Resources Authority for Gauteng
RE	Resident Engineer
WUL	Water Use License
WULA	Water Use License Application
WWTW	Wastewater Treatment Works

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DEFINITIONS

Environment

The surroundings in which humans exist and which comprise of:

- Land, water and atmosphere of the earth.
- Micro-organisms, plant and animal life.
- Any part or combination of a) and b) and the interrelationships among and between them.
- The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that can influence human health and well-being.

Environmental Aspect

Those components of the company's activities, products and services that is likely to interact with the environment.

Environmental Authorisation

The written statement from the relevant environmental authority in terms of the National Environmental Management Act (Act 107 of 1998), with or without conditions, that records its approval of a planned activity and the implementation thereof and the mitigating measures required to prevent or reduce the effects of environmental impacts during the life of a contract.

Environmental Impact Assessment (EIA)

The decision making process of examining the environmental impacts of a development in terms of the NEMA (107 of 1998) and the EIA Regulations (Government Notice No. R982, R983, R984, R985 and R986) as amended.

Environmental Management Programme (EMPR)

An environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced.

Environmental Management System (EMS)

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A set of process and practices that enable an organization to reduce its environmental impacts and increase its operational efficiency. The EMS provides a framework that helps a company achieve its environmental goals through consistent control of its operations.

Auditing

A systematic and objective assessment of an organization's activities and services conducted and documented on a periodic basis internally and externally.

Environmental Objective

An overall environmental goal, arising from the environmental policy, that an organization sets itself to achieve, and which is quantified where practicable.

Environmental Target

A detailed performance requirement quantified where practicable, applicable to the organization or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.

Floodplain

A flat expanse of land bordering a river channel, formed through sediment deposition and other alluvial processes, and often characterized by frequent flooding as a result of bank overspill from the river channel.

Groundwater

Sub-surface water in the zone in which permeable rocks, and often the overlying soil, are saturated.

Hazardous waste

Waste that are proven to be toxic, corrosive, explosive, flammable, carcinogenic, radioactive, poisonous or classified as such in legal terms.

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Heritage Resource

Any place or object of cultural significance including buildings, structures, landscapes, graves and geological, archaeological artefacts and paleontological sites.

Landscape

Land modified for human use and occupation, embracing both the natural (wilderness) environment and the urban.

Management actions

Practical actions aimed at achieving management objectives and targets.

Management objectives

Desired outcome of management measures for mitigating negative impacts and enhancing the positive impacts related to project activities and aspects (i.e. risk sources).

Monitoring

A systematic and objective observation of an organization's activities and services conducted and reported on regularly.

Natural Vegetation

All existing vegetation species, indigenous or otherwise, of trees, shrubs, groundcover, grasses and all other plants found growing on the site.

Pollution

Any change in the environment caused by substances, radioactive or other waves, or noise, odours, dust or heat, emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such

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an effect in the future. Furthermore, pollution can also be regarded as an undesirable state of the natural environment being contaminated with harmful substances as a consequence of human activities.

Protected Plants

Plant species officially listed on the Protected Plants List (each province has one), and which may not be removed or transported without a permit to do so from the relevant provincial authority.

Reinstatement

Reinstatement is defined as the return of a disturbed area to a state, which approximates the state (where possible), which it was before disruption.

Riparian Habitat

The physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.

Runoff

The total water yield from a catchment including surface and subsurface flow.

Sensitive environmental features

Environmental features protected by legislation (e.g. heritage resources), or identified during the EIA as sensitive through specialists' findings and input received from Interested and Affected Parties.

Subsoil

The soil horizons between the topsoil horizon and the underlying parent rock.

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Topsoil

Topsoil can be regarded as the fertile upper part or surface of the soil.

Transplanting

The removal of plant material and replanting the same plants in another designated position.

Veld

Unimproved areas of natural vegetation

Wastewater

Water contaminated by the project activities.

Watercourse

A geomorphological feature characterized by the presence of a stream flow channel, a floodplain and a transitional upland fringe seasonally or permanently conveying surface water.

Waterlogged

Soil or land saturated with water long enough for anaerobic conditions to develop.

Weeds and Alien Invasive Plants

Weeds and Alien Invasive plants are defined as undesirable plant growth that shall include, but not be limited to all declared category 1, 2 and 3 listed Alien Invasive species as set out in the Conservation of Agricultural Resources Act (No 43 of 1983) regulations. Other vegetation deemed to be invasive should be those plant species that show the potential to occupy in number, any area within the defined construction area.

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Wetland

Land where a surplus of water (i.e. waterlogging) is the key factor determining the nature of the soil development as well as the types of plants and animals living at the soil surface.

1. BACKGROUND

The purpose of this document is to provide management measures that will ensure that potential negative impacts associated with the activity are minimized whilst positive impacts are optimised, provided that the EMP is implemented by a suitably qualified Environmental Officer (EO). The development proponent, the main contractor and the sub- contractor are responsible for the implementation of the EMP throughout the stages. Therefore, it is imperative that the EMP is circulated to site managers, contractors and Depots who will perform any work on site which has the potential to cause environmental damage. Any parties responsible for transgression of the underlying management measures outlined in this document will be held liable for non- compliances.

The following is a generic EMP to mitigate against “generally occurring impacts” associated with the construction phase of Johannesburg Water’s activities. "Generally occurring impacts" refers to potential impacts typical of Johannesburg Water’s activities and are not restricted to a single or specific site. The findings of this EMP will be implemented at all sites.

This section is an essential component of the contract specification and shall be included during **planning, design, construction, and operational phases.**

PURPOSE

The purpose of this EMP is to ensure that Johannesburg Water conducts all its activities related to the construction and maintenance in accordance with the provisions of NEMA, and other applicable legislations. This EMP has considered the provisions of the Constitution and the principles of Integrated Environmental Management.

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2. APPLICABLE LEGISLATIONS

Several laws and regulations apply to the protection of the environment. These laws contain environmental principles and standards that need to be applied when applicable permits and licences that need to be obtained. This EMP will be subject to regulatory control under a range of State, Provincial and Local regulations. Such legislation largely embraces pollution prevention, sustainable resource use, conservation, and socio cultural (heritage) protection. This chapter reviews legislation pertaining to this generic EMP.

According to Section 2 (1, 2 & 3) of the National Environmental Management Act No. 107 of 1998 (NEMA), all organs of state must apply certain principles set out in NEMA when taking decisions that may significantly affect the environment. The key principles of this Act include that all “actions” that they approve must be economically, socially, and environmentally sustainable. It further states that “people and their needs” must be at the forefront of “its concern” and their interests must be served equitably. These legislative requirements include, but are not limited to, the provisions of the legislation represented as described below:

The Constitution of the Republic of South Africa Act No. 108 of 1996)

Section 24 of the Constitution of South Africa (Act 108 of 1996) states that “Everyone has the right (a) to an environment that is not harmful to their health or well-being; and

(b) To have the environment protected, for the benefit of present and future generations through reasonable legislative and other”

Measures that:

- Prevent pollution and ecological degradation;
- Promote conservation; and
- Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development”.
- Section 152 of the Constitution states that the objectives of local government are to:
- Ensure that services are provided to communities in a sustainable manner.

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- Promote social and economic development; and
- Promote a safe and healthy environment.

National Environmental Management Act No. 107 of 1998 (as amended)

The National Environmental Management Act 107 of 1998 (NEMA) requires that an environmental authorization is obtained before activities, which have been listed in terms of NEMA, are commenced with. The failure to obtain such an environmental authorization, before commencing with listed activities, could result in administrative sanctions, including compliance notices or directives ordering the cessation of the operations until authorized; and fines of up to ZAR10 million for each such contravention.

The Environmental Impact Assessment Regulations (EIA Regulations) set out the process to be followed in applying for an environmental authorization, while the listing notices; list the activities that require authorization (the Listing Notices). NEMA 107 of 1998 amended in 07 of April 2017. The following are the listed activities:

- EIA Regulations GNR 326
- Listing Notice 1; Government Notice Number (GNR) 327 (Basic Assessment).
- Listing Notice 2; Government Notice Number (GNR) 325 (Full EIA/ Scoping & Environmental Impact Report).
- Listing Notice 3; GNR 324 (It applies on both Basic Assessment and full EIA).

National Environmental Management: Biodiversity Act No. 10 of 2004

Provides management and conservation of South Africa's biodiversity within the framework of NEMA 107 of 1998; the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.

The National Environmental Management Waste Act 59 of 2008

The National Environmental Management Waste Act (NEMWA) reforms the law regulating waste management in order to protect health and the environment providing reasonable measures for the

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prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.

The Occupational Health and Safety Act No. 85 of 1993

The Occupational Health and Safety Act make provision in regulation

- Section 8 for the general duties of employers to their employees.
- Section 9 of the Regulations makes provision for general duties of employers and self-employed persons to persons other than their employees.

National Heritage Resources Act (NHRA) No. 25 of 1999

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act. The South African National Heritage Resources Agency (SAHRA) is the responsible authority for implementing the National Heritage Resources Act (NHRA) 1999, (Act 25 of 1999).

Section 38(1) of the NHRA lists development activities that would require authorisation by the responsible heritage resources authority. Activities considered applicable to the proposed project include the following:

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length.

(b) the construction of a bridge or similar structure exceeding 50 m in length; and

(c) any development or other activity which will change the character of an area of land, or water -
i exceeding 5 000 m² in extent,

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- ii involving three or more existing erven or subdivisions thereof; or
- iii involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- iv the costs of which will exceed a sum set in terms of regulations by SAHRA or a Provincial Heritage Resources Authority.
- v Resources Authority.
- (d) the re-zoning of a site exceeding 10 000 m² in extent; or
- (e) any other category of development provided for in regulations by SAHRA or a Provincial Heritage Resources Authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development.

Water Services Act No. 108 of 1997

This Act provides for the rights of people to basic water supply amongst others basic sanitation. It acknowledges that there is a duty on all spheres of government to ensure that sanitation services are provided in a manner which is efficient, equitable and sustainable and that it should be sufficient for subsistence and sustainable economic activity. The provision of sanitation services must be undertaken in a manner consistent with the broader goals of water resource management. This goal is in line with the Act as it aims to provide sufficient sanitation services to the region in a sustainable manner.

Conservation of Agricultural Resources (CARA) Act, Act No. 43 of 1983

The CARA aims to ensure the protection of agricultural resources such as land with agricultural potential and water and makes provision for the eradication of alien and invasive species, and protection of topsoil.

NEMA Air Quality Act (AQA), Act No. 39 of 2004

The aim of this law is to regulate air quality and protect the environment in South Africa through reasonable measures to prevent pollution and ecological degradation, while securing sustainable development. The Act also provides national norms and standards for air quality management, monitoring and control. Under this legislation, Priority Air shed Areas can be proclaimed, where specific

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Air Quality Management Plans are applicable. Regulations are also published under this Act for the format of air quality assessments and what should be included in the assessment. Any Air Quality Management Plan which has been compiled for the area and any proposed WWTW should be in line with this Management Plan. This Act may list activities which may result in atmospheric emissions, and which may have a significant detrimental effect on the environment.

Government Gazette 32434 of 24 July 2009 listed activities, which require an atmospheric emission license before it commences. Air quality limits and thresholds are fundamental to effective air quality management, providing the indicators to safe exposure levels for the majority of the population. The current South African standards have been revised and National Ambient Air Quality Standards were promulgated on the 24th of December 2009 (Government Gazette No. 32816, Notice No. 1210). The newly proposed standards include particulate matter specifically PM₁₀ (particulates with a diameter of less than 10 micrometre), sulphur dioxide (SO₂), nitrogen dioxide (NO₂), ozone (O₃), lead, carbon monoxide (CO) and benzene. These revised standards have been adopted as the VTAPA air quality objectives. Any emissions from the proposed WWTW should be within these standards.

National Water Act (NWA), 36 of 1998

Water use is controlled by the National Water Act (NWA) Act No. 36 of 1998. The NWA recognises that water is a scarce resource in South Africa and its provisions are aimed at achieving sustainable use of water to the benefit of all users. The provisions of the Act are thus aimed at discouraging pollution and waste of water resources. According to Section 21 of the NWA the following activities require a water use licence (WUL) prior construction:

- “21.(a) taking water from a water resource;
- 21.(b) storing water;
- 21.(c) impeding or diverting the flow of water in a watercourse;
- 21.(d) engaging in a stream flow reduction activity contemplated in section 36;
- 21.(e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- 21.(f) discharging waste or water containing waste into a water resource through a pipe, canal,

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sewer, sea outfall or other conduit;

21.(g) disposing of waste in a manner which may detrimentally impact on a water resource;

21.(h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;

21.(i) altering the bed, banks, course or characteristics of a watercourse;

21.(j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and

21.(k) using water for recreational purposes.”

3. OBJECTIVES OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The purpose of this EMP is to provide an easily interpreted reference document that ensures that the project environmental commitments, safeguards and mitigation measures from the environmental planning documents, project approvals, and scope of work are implemented.

The objectives for the EMP are:

- To develop, implement and maintain effective management systems for the environmental aspects.
- To document details of environmental protection infrastructure and controls so that they are able to provide long term protection for the natural environment.
- To ensure compliance with relevant legislation (National, Provincial and Local), regulatory requirements and environmental documents.
- To maximise the value and outcomes of environmental monitoring activities so that the information can be applied to the planning and implementation of future projects.
- To ensure that all Environmental Management considerations are implemented during the planning, operational and maintenance phases of the project.

All the environmental specifications and the procedures discussed in this document were also developed in accordance with the relevant legislation applicable to the development.

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3.1 Phases of the Project

The EMP deals with the following phases as detailed below:

3.1.1 The Planning and Design Phase

Overall Goal for Planning and Design: Undertake the planning and design phase of the development in a way that:

- Ensures that the design of the proposed development responds to the identified environmental constraints and opportunities.
- Ensures that the best environmental options are selected for all components of the project.
- **Ensures that there is sufficient financial provision for environmental assessment, monitoring, rehabilitation, and maintenance. The JW rehabilitation calculation template must be used (See Annexure D).**
- The qualified landscaping specialist must be appointed to undertake rehabilitation on site. The landscaping specialist must pose the following qualifications and work experience:
 - Landscaping Specialist should at least have BA/BSc Honours Degree or 4-year Degree in Natural Sciences/Ecological
 - The Landscaping Specialist must at least be registered with South African Council for Natural Scientific Professions (SACNASP) as a Professional Natural Scientist (Copy of SACNASP Certificate must be submitted).
 - At least three letters from their client/s must be submitted, detailing the landscaping work he/she has undertaken (letters should have the name of the client, description of the project and/or scope of work done, contact details and must be signed). Letters should be in their client's company letterhead, and it must indicate if the work has been completed satisfactorily or not.
 - Copy of CV must be submitted, specialist should at least have a minimum of five (5) years working experience as landscaping Specialist (See Table 1).

The EMP offers an ideal opportunity to incorporate pro-active environmental management measures with the goal of attaining sustainable development.

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Pro-active environmental measures minimize the chance of impacts taking place during the construction and operational phase. There is still the chance of accidental impacts taking place; however, through the incorporation of contingency plans (e.g., this EMP) during the planning phase, the necessary corrective action can be taken to further limit potential impacts. In order to meet this goal, action plans for planning and design stages of the project must be identified together with monitoring requirements.

3.1.2 The Construction Phase

The bulk of the impacts during this phase will have immediate effect (e.g., noise-, dust- and water pollution etc.) If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the contingency plans identified in the planning phase, together with a commitment for sound environmental management from Johannesburg Water and its agents.

3.1.3 Rehabilitation and Reinstatement Phase

This phase will involve restoring the land impacted during the construction phase back to its original state (in the case of slopes, gradients, soil profiles, and hydrology) or better. This process will be mainly on rectifying the negative impacts that have been caused during construction by the removing pollution or contaminants and other dangerous substances from groundwater, sediment, or surface water and improvement of the soil.

3.1.4 The Operational Phase

By taking pro-active measures during the planning and construction phases, potential environmental impacts emanating during the operational phase will be minimised. This, in turn, will minimise the risk and reduce the monitoring effort, but it does not make monitoring obsolete.

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4. ROLES AND RESPONSIBILITY

The implementation of this EMP requires the involvement of several stakeholders, each fulfilling a different but vital role to ensure sound environmental management during the construction and operational phases. The stakeholders are discussed below:

4.1 Johannesburg Water and its Agents shall:

Ensure that the EMP is kept on JW's Sites and construction sites.

- Remain ultimately responsible for ensuring that the development is implemented according to the requirements of the EMP.
- Ensure that the Environmental section attends all project related tender briefing sessions.
- Although Johannesburg Water appoints specific role players to perform functions on its behalf, this responsibility is delegated.
- Be liable for restoring the environment in the event of negligence leading to damage to the environment.
- Ensure that the EMP is included in the tender documentation so that the contractor who is appointed is bound to the conditions of the EMP, and there's sufficient budget for environmental assessments and/or assessment during the planning, design, construction, replacement of vegetation and restoration of habitats, decommissioning (rehabilitation) phases of the project.
- Ensure that the contractor appointed understands, acknowledges and fully accepts the content of this EMP and their responsibilities for implementation and compliance.
- Monitor compliance with the conditions of the environmental authorisation and the EMP and compliance audits are undertaken.
- Ensure that the Environmental section signs all close out reports to confirm rehabilitation.

4.2 Appointments and competencies

- The contractor and its appointed sub-contractor must meet the relevant legislative and non-statutory appointments, which must be maintained valid for the entire contract duration.

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- All appointees shall be suitably trained and certified competent for the responsibilities they are assigned for.
- Copies of all relevant appointments and the relevant competence certificates must be kept in the relevant Environmental file.

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Table 1: Environmental Officer's Appointment Index

Appointment	Project Type	Legislative Ref	Competency requirements (Min)
Contractor SHE Officer	Unauthorised Project	JW EMP/ JW Waste Management Procedure	National Diploma in Safety & ISO14001:2015 (Introduction/Awareness, implementation, and auditing ISO14001:2015) + 2 years' Experience OR National Diploma in Environmental Management + 2 years' Experience OR NEBOSH / SAMTRAC & Basic ISO14001:2015/ Basic Environmental Awareness (Introduction and Implementations to ISO14001:2015) + 4 years' Experience. Register with SACPCMP.
Contractor Environmental Liaison Officer/Environmental Officer	Authorised project	JW EMP and Project Specific approved EMP /Directives/Environmental Authorisation/GA/WUL	National Diploma in Environmental Management/ + 3 years' Experience. BA/BSc Environmental Management + 3 years' experience. The recommended and/or market related minimum Salary/wages for ELO/EO should be R17 000.00.

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Environmental Representative/Environmental Rep	Unauthorised Project	JW EMP	Must hold a Senior Certificate (Matric) and one of the following qualifications. National Diploma in Environmental Management/ BA/BSc Environmental Management or Science/ISO 14001:2015(Introduction; Implementation and Auditing/Certificate in Environmental law/National Certificate in Environmental Management. The recommended and/or market related minimum salary/wages for Environmental Representative should be R10 000.00 .
Consultant Environmental Control Office	Authorised project (as and when required)	JW EMP and Project Specific approved EMP /Directives/Environmental Authorisation/GA/WUL	Reputable Environmental Consulting Company National Diploma or BA/BSc Environmental Science or Management + 3 years' experience as an independent ECO/Consultant
Landscaping Specialist	Unauthorised and Authorised project	JW EMP and Project Specific approved EMP /Directives/Environmental Authorisation/GA/WUL	Reputable Environmental Consulting firm /Landscaping Company.

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			Landscaping Specialist should at least have BA/BSc Honours Degree or 4-year Degree in Natural Sciences/Ecological. - The Landscaping Specialist must at least be registered with South African Council for Natural Scientific Professions (SACNASP) as a Professional Natural Scientist (Copy of SACNASP Certificate must be submitted). - Specialist should at least have a minimum of five (5) years working experience as landscaping Specialist (See Table).

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4.3 The Contractor shall:

- Be bound to conform to the EMP conditions through his/her contract with Johannesburg Water, and is responsible for ensuring that he adheres to all the conditions of the EMP.
- Thoroughly familiarise with the EMP requirements before construction begins and must request clarification on any aspect of these documents, should they be unclear.
- Be responsible for mitigation and rehabilitating all environmental damage at his/her expense.
- Ensure adherence to, and implementation of, the environmental management specifications.
- Ensure that environmental damage, whether intentional or unintentional, is prevented in the first instance, mitigated and rehabilitated, and must adopt a proactive approach followed by a reactive approach.
- Ensures identification of, and compliance with, all environmental laws, all by laws and regulations.
- Ensure that any instructions (whether verbal or written) issued by the site manager, project manager, site engineer or EO, in terms of the EMP is adhered to.
- Ensure that an environmental compliance report is tabled at each site meeting, which must document all incidents, complaints, and non-compliances, and their close out progress, which has occurred during the period before the site meeting.
- Provide a photographic report to JW upon request showing close out of identified issues.
- Provide any project or compliance information that may be requested by JW in any format as requested.
- Ensure that proposed site camp areas are approved by JW environmental section prior to establishment.
- Ensure compliance with the EMP conditions even if there will be no site camps or the project is an emergency or subject to Directives.
- Take comprehensive site photographs for before, during and after construction.
- Ensure that each individual resident/landowner/stakeholder requirement is documented, pertaining to the area to be disturbed, special features, vegetation to be disturbed, rehabilitation requirements (contractors must state to residents/stakeholders that indigenous vegetation species will be put

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back, however, should residents/stakeholder require non-indigenous species to be replaced, these are to be documented before being affected) prior to any disturbance.

- Provide a detailed, site-specific method statement for rehabilitation, which must be approved by JW Engineer and EO.
- Ensure that a report is tabled at each site meeting, which will document all incidents that have occurred during the period before the site meeting.
- Ensure that incidents register is kept in the site office.
- Ensure that a register of all public complaints is maintained.
- Ensure that all employees, including those of sub-contractors receive Environmental Induction before the commencement of construction in order that they can constructively contribute towards the successful implementation of the EMP (i.e., ensure their staff are appropriately trained as to the environmental obligations).
- Ensure that all disturbed areas are rehabilitated and at least 85% healthy grass/ground cover has established, that rehabilitation is maintained, the sites are free of erosion, waste and pollution of any kind including rubble and spills, and free of weeds and alien invasive species.
- Appoint an Environmental Liaison Officer (ELO) prior Construction for Environmental Authorised Projects.
- Appoint SHE Officer prior Construction for unauthorized projects i.e., the SHE Officer with Environmental Management experience or be trained on Environmental legislation.
- Provide accurate and factual information pertaining to the projects, communications, and discussions at all times.
- Is responsible for NEMA Duty of Care, and Polluter pays principle.

4.4 Environmental Liaison Officer (ELO)/ SHE Officer shall:

- Ensure that the project team is involved in all aspects of project planning that can influence environmental conditions on the site.
- Be permanently on site during the construction phase to oversee the Contractor's internal compliance with the EMP requirements and ensuring that the environmental specifications are adhered to.

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- Assist with day-to-day monitoring of the construction activities. Ensure that any issues raised by the EO will be routed to the SHE Officer for the contractors' attention.
- The ELO/ SHE Officer shall be permanently on site during the construction phase to oversee the Contractor's internal compliance with the EMP requirements and ensuring that the environmental specifications are adhered to.
- Be responsible for keeping detailed records of all site activities that may pertain to the environment and include all these aspects in an environmental register.
- Maintain site documentation and records related to environmental management (EMP, authorisations, permits, way-eaves, method statements, audit reports, monitoring results, receipts for waste removal, environmental file, etc.)
- The ELO/SHE Officer must keep a register of complaints from any community members on environmental issues.
- The ELO /SHE Officer will be required to keep a record of all on-site environmentally related incidents and how these incidents were dealt with.
- Ensure daily implementation of the EMP conditions, and monitoring of the contractor's compliance with EMP conditions, using checklists and visual inspections.
- Provide location details for possible site camp locations to JW environmental section and await approval from this section before establishing.
- Inform JW environmental section when actual work is about to commence.
- Inform JW environmental section of pending completion activities and intention to de-establish, prior.
- Ensure proper rehabilitation is undertaken before site closure.

4.5 Resident Engineer (RE)/ Site Agent shall:

- Liaise with the Contractor and Environmental Officer (EO) on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences.
- Oversee the general compliance of the Contractor with the EMP and other pertinent site specifications.

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- Familiarise him/herself with the EMP specifications and further monitor the Contractor's compliance with the Environmental Specifications daily through the Site Diary and enforce compliance.
- Ensure that Monthly Audits reach the contractor before Monthly Progress Meeting.
- Ensure proper rehabilitation is undertaken before site closure.

4.6 Project Engineer /Inspectors (PE/PI) shall:

- Ensure that there is a sufficient budget for complying with all EMP conditions at the tender stage.
- Ensure sufficient budget is provided for rehabilitation/ Reinstatement.
- Ensure proper rehabilitation is undertaken before site closure.
- Ensure of all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these.
- Ensure that Contractor(s) are made aware of all stipulations within the EMP.
- Ensure that the EMP is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.
- Be fully conversant with the EIA for the project, the EMP, the conditions of the Environmental Authorisation (if applicable), and all relevant environmental legislation.
- Ensure compliance monitoring of contractors on a day-to-day basis.
- Ensure adherence and implementation of the tender requirements.
- Ensure reference of specific non-compliance/non-conformance issues to the responsible units and/or contractors.

4.7 Environmental Officers shall:

- Be responsible for informing the contractors of any decisions that are taken concerning environmental management during the project phase.
- This would also include informing the contractors of the necessary corrective actions to be taken, issuing stop work orders and rehabilitation and remediation instructions if necessary.
- Liaise with environmental authorities where necessary.
- Review all the environmental documents submitted by the Contractor, including sign off.

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- Review all the environmental documents from the Contractor, including sign off.
- Conduct environmental monthly audits of all contractors' work on site where necessary
- Maintain site documentation of related to environmental management (EMP, Method statements, audit reports, monitoring results, receipts of waste removal etc.). Documents to be maintained on the relevant site Documents Control Systems.
- Inspect and report on environmental incidents and check corrective actions.
- Conduct environmental incidents enquiries.
- Review and sign off method statements prepared by Contractors.
- Ensure that an environmental compliance monitoring strategy/framework is implemented.

4.8 Environmental Control Officer (ECO)

The role of the ECO shall be to:

- Act as site 'custodian' for the implementation, integration, and maintenance of the EMPr in accordance with the contractual requirements.
- Ensure successful implementation of the EMPr; and
- Ensure that the Contractor, his employees and/or Subcontractors receive the appropriate environmental awareness training prior to commencing activities.

The responsibilities of the ECO will be to:

- Liaise with the JW Environmental Section and Project Engineer on the level of compliance with the EMPr achieved by the Contractor on a regular basis for the duration of the contract.
- Advise the Project Engineer on the interpretation and enforcement of the Environmental Specifications (ES), including evaluation of non-compliances.
- Enforce compliance with the EA and EMP through audit report and checklist
- Supply environmental information as and when required.
- Review and approve Method Statements produced by the Contractor, in conjunction with the PM and EO.
- Monitor any basic physical changes to the environment because of the construction works according to an audit schedule.

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- Attend regular site meetings and project steering committee meetings.
- Undertake regular monthly audits of the construction works and to generate monthly audit reports. These reports are to be forwarded to the JW EO who will communicate the results and conclusions with the principal Contractor.
- Submit audit reports to the authority as per the requirement of issued Environmental Authorisation.
- Communicate frequently and openly with the Contractor and the Project Engineer to ensure effective, proactive environmental management, with the overall objective of preventing or reducing negative environmental impacts and/or enhancing positive environmental impacts.
- Advise the Project Engineer on remedial actions for the protection of the environment in the event of any accidents or emergencies during construction, and to advise on appropriate clean-up activities.
- Review complaints received and made instructions as necessary; and
- Identify and make recommendations for minor amendments to the EMP as and when required.

4.9 Environmental Representative (Environmental Rep) shall:

- Review the effectiveness of environmental measures in the workspace/construction environment for which he/she was appointed.
- Identify potential impacts in the workplace.
- Investigate environmental incidents and identify root causes.
- Investigate Environmental Complaints.
- Conduct Awareness training.
- Participate in Environmental inspections.
- Ensure compliance with JW EMP and other environmental management related legislations.
- Ensure Proper Rehabilitation is conducted.
- Attend site SHE meetings where Environmental issues are addressed.
- Guide Construction crew/team on environmental requirements as per JW EMP.
- Assist in day-to-day monitoring of construction activities.

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- Assist in implementation of ISO 14001:2015 standard.
- Assist the SHE Officer/EO with preparation of audits /inspections.

5. CONTENTS FOR CONTRACTOR'S ENVIRONMENTAL FILE

The following documents must be submitted by the contractor in the Environmental file before Construction commences on site. The file must be submitted to the Environmental Section prior construction for approval. The Contractor should achieve a minimum score of 80% for the file to be approved (**Refer to Annexure B: Environmental File Specification**).

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6. ENVIRONMENTAL SPECIFICATIONS

Table 2: Environmental Management and Mitigation Measures that must be implemented during the Design Phase and Construction Phase

Design Phase Measures						
Aspects	ID	Mitigation Measure/Procedure	Responsible	Implementation Timeframe	Monitoring Methods	Performance indicators
Project Planning/Design	1	- Proposed project is submitted to Environmental Section for screening (Project scope/layout/Maps), - CAPEX and Ops must ensure that there is budget allocated for environmental management throughout the project life cycle i.e., planned project and Directives.	Johannesburg Water (CAPEX/Ops)	Before project commences	- Screening report - Tender document	Keep the records of the project screening report and scope of work as per Directives
Authorisation	2	- Appoint Consulting Company - Ensure that all required licences and permits have been obtained before the start of construction. - Ensure that ECO and/or ELO is appointed as per the authorisation and EMP requirement during project execution (as when and required).	Johannesburg Water (CAPEX/ Environmental Section)	Before construction commences	Keep record of all permits, licences and authorisations	Keep record of all permits, licences and authorisations
Project Handover	3	- The scope of a project is outlined by CAPEX Engineer during the handover meeting. - Environmental Management Requirements are outlined during the handover meeting.	Johannesburg Water (CAPEX/ Environmental Section)	Before construction commences	Meeting invite EA/GA/WUL/ Screening report	Keep record of all permits, licences and authorisations
Environmental Awareness Training/Induction s	4	- Environmental awareness training is given to the Project Team Leaders - Environmental File Specification provided to the Contractor. - JW Environmental Management Plan and other procedures are provided to the Contractor.	Johannesburg Water (CAPEX/ Environmental Section)	Before construction commences	Meeting invite	Meeting records

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Environmental File & Evaluation	5	- Contractor submits environmental file for approval prior work commences on site. - Construction activities/work (including site establishment) should ONLY commence when file is approved.	Appointed Contractor/Environmental Section	Before construction commences	Environmental evaluation report.	Approval/ rejection letter records
Construction Phase Measures						
Aspects	ID	Mitigation Measure/Procedure	Responsible	Implementation Timeframe	Monitoring Methods	Performance indicators
Site camp establishment	1	- Invite the Environmental Officer for the site inspection of proposed site camp prior establishment. - Submit a method statement for Site Camp establishment for approval by JW Environmental Officer/ECO prior commencement of works. - Establish a suitably fenced Site Camp at the start of the contract, which will allow for site offices, vehicle, equipment, material, and waste storage areas to be consolidated as much as possible. Locate the Site Camp at a position approved by the JW EO, at least 100m from watercourses and in an area which is not ecologically sensitive. - Provide water and/or washing facilities at the Site Camp for personnel. - Limit construction and lay down areas to areas within the development footprint. - Ensure that environmentally friendly on-site sanitation options are selected, and these facilities are properly managed and maintained. - Designated eating areas shall be provided on site. - These eating areas shall be clearly demarcated and shall be provided with bins with lids.	All Contractors	Before commencement of Project	- Visual inspection - Site establishment checklist/Method statement	Method statements approved by CAPEX and the Environmental Officer - Position of Site Camp approved by ECO - Security and access to Site Camp controlled - Clear demarcation of no-go areas as agreed with JW EO. - Detailed site layout plan - Environmental file approval letter.

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		- Staff will be prohibited from consuming meals anywhere other than at these eating areas and that noise is limited. - All eating areas shall include provision for a water and smoking area.				
Environmental Awareness Training	2	- Provide environmental awareness training to all personnel on site at the start of their employment. Training should include discussion of: - Potential impact of construction waste and activities on the environment. - Suitable disposal of construction waste and litter. - Key measures in the EMP relevant to worker's activities. - How incidences and suggestions for improvement can be reported. - Ensure that all attendees remain for the duration of the training and on completion sign an attendance register that clearly indicates participants' names.	All Contractors	- Before workers start working onsite - Before new activities are undertaken	- Check training attendance register - Observe whether activities are executed in line with EMP requirements	- Proportion of workers that completed. - Environmental training Compliance of workers with EMP
Plant Search and Rescue/Vegetation clearing	3	- From information gathered during the plant marking exercise, establish the size. - Requirements for the plant rescue team workforce, and the methodology to be employed during the rescue to maximise the likelihood of success; Document and motivate which species found on site are considered to be conservation worthy. - Follow a multi-pronged approach to maximise the likelihood of success wherever feasible. In addition to transplanting of whole plants, seed can be collected and sown in situ in suitable habitats and/or in an off-site nursery. - Any plants not suitable for transplantation must be considered for transplanting to existing conservation	All Contractors	Before commencement of activities	Visual Inspection/ inspection by Botanist/Ecologist	- Incidents of harm coming to fauna/ flora. - Number of incidents of disturbance of vegetation outside construction site boundary; and - Size of area cleared relative to

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		areas nearby. This could involve growing these plants on in an off-site nursery for a period of time. - Depending on the conservation worthy species found, the location of suitable existing conservation areas nearby and the location of the off-site nursery, the most appropriate plant rescue options must be detailed in the search and rescue plan, and could be a combination of the following options: - All required permits must be obtained from the appropriate authority covering plants to be affected by the plant rescue operation prior to the removal of the plants. - Demarcate the area for construction prior to each phase and prevent access by construction personnel outside of this area. - Appoint a suitably qualified botanist to undertake search and rescue of key plant species in the development footprint where necessary (Where is applicable. Clearly demarcate sensitive areas, including buffers, with appropriate signage. - Do not allow personnel to enter calcrete vegetation areas. - Do not allow personnel to pick or destroy plants outside of the construction footprint. - Limit clearing to those areas within the footprint of construction for each phase. - Restrict construction vehicles to designated roadways. - Do not allow the temporary storage of building material within sensitive areas. Aftercare and monitoring				development footprint - Size of area disturbed outside of construction site boundary. - Areas of development footprint must be clearly demarcated

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		- Record numbers and diversity of propagated plants and the health of the same, until they can be planted out; - Aftercare of transplanted plants to be done in accordance with the plant search and rescue plan by an appropriate agent (e.g., staff from the commercial nursery or an appropriately trained onsite Contractor), including watering and alien plant control requirements. If done correctly, the frequency of input will decrease with time. - Record numbers and diversity of transplanted plants and the health of the same. - Monitoring must be undertaken as per requirements of the plant search and rescue plan approved by GDARD, including monitoring of alien plants and maintenance of a photographic record; and - Provide a detailed record (including photographic record) that indicates the success of the plant rescue operation. Records of corrective action taken to improve management of transplanted plants, where relevant, must also be completed. Applicable Legislation - National Environmental Management Act: Biodiversity Act (Act 10 of 2004) including Threatened or Protected Species Regulations. - National Environmental Management Act (Act 107 of 1998). - Gauteng Nature Conservation Bill, 2014/Transvaal Nature Conservation Ordinance 12 of 1983; and - National Forests Act (Act 30 of 1998).				

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Excavation	4	- The process of excavation and back filling must be carried out as a sequential process following one another as quickly as possible. - Excavations must only remain open for a minimum period of time and during this time they must be clearly demarcated. If excavations place the public at risk these sites must be fenced. - Where possible, close excavations immediately after pipe is laid. - The residents directly affected by open trenches must be notified of the dangers. This will be done during the site-specific phase. - Danger tape shall not be utilised to prevent personnel from open excavations, orange nets should be used for all open excavations on site. Construction vehicles should avoid creating new roads, use existing roads. - Wet exposed surfaces using a water cart, bowser or use a biodegradable and environmentally friendly soil binder to prevent dust emissions. - Dewater excavations regularly and channel water to areas of grass cover. If dewatering is near/within a watercourse and is to be discharged to a watercourse, ensure a silt fence/net and sandbags are used to reduce silt loads. - Topsoil must be cleared (considered to be the upper 150mm of soil surface) and retained as it contains most inorganic matter and nutrients. Topsoil must be kept separate from subsoil and stored in windrows parallel to excavations. - Harvested grass should be retained and used as a mulch to combat erosion.	All Contractors	Throughout construction	Visual inspection	- Daily site inspection. - Damage to the environment (sensitive environment)

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		• Soil should be exposed for the minimum time possible once cleared of indigenous or invasive vegetation. • Avoid prolonged exposure of soils to wind and water erosion when clearing and grubbing. • The stockpiled topsoil (which will be left standing for more than 1 month) must be covered with suitable fabric, and / seeded, to prevent erosion and weed invasion. • Stockpiled topsoil must be covered with suitable fabric to prevent erosion and weed invasion. • No vehicles are allowed to access onto the stockpiles after they have been placed. • Topsoil and subsoil must be kept separate throughout construction and rehabilitation. • A marsh wire or snow netting shall be erected around the exposed excavations to warn the public. • The contractor must rip and rehabilitate temporal roads after project completion. • The Contractor shall be in possession of an emergency oil and chemical spill kit, drip trays and bioremediation substances/enzymes that must be complete and available on site at all times.				
Topsoil and subsoil	5	• The contractor should remove 150mm of topsoil and stockpile at a height of not more than 1m. • Topsoil should be temporarily stockpiled, separately from (clay) subsoil and rocky material, when areas are cleared. If mixed with clay sub-soil the usefulness of the topsoil for rehabilitation of the site will be lost. • Stockpiled topsoil should not be compacted and should be replaced as the final soil layer. No	All Contractors	During Vegetation clearance	Visual inspection	• Incident of incorrect storage and harvesting. • Manifestation of alien invasive plants. • Incident of erosions.

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		vehicles are allowed access onto the stockpiles after they have been placed. • Stockpiled soil should be protected by erosion-control berms if exposed for a period of greater than 14 days during the wet season and seeded. • Topsoil must be hydro seeded during shut down in December. • Topsoil stripped from different sites must be stockpiled separately and clearly identified as such. • Topsoil obtained from sites with different soil types must not be mixed. • Topsoil stockpiles must not be contaminated with oil, diesel, petrol, waste or any other foreign matter, which may inhibit the later growth of vegetation and micro-organisms in the soil. • Soil must not be stockpiled on drainage lines or near watercourses without prior consent from the Project Manager. • Soil should be exposed for the minimum time possible once cleared of invasive vegetation, that is the timing of clearing and grubbing should be co-ordinated as much as possible to avoid prolonged exposure of soils to wind and water erosion. • Stockpiled topsoil must be either vegetated with indigenous grasses or covered with a suitable fabric to prevent erosion and invasion by weeds. • Limited vehicular access is allowed across rocky outcrops and ridges. • All cut and fill surfaces need to be stabilized with appropriate material or measures when major civil works are complete. • Erosion and donga crossings must be dealt with as river crossings. Appropriate soil erosion and control				

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		procedures must be applied to all embankments that are disturbed and destabilized as per the Authorisation - All equipment must be inspected regularly for oil or fuel leaks before it is operated. Leakages must be repaired on mobile equipment or containment trays placed underneath immobile equipment until such leakage has been repaired. - Soil contaminated with oil must be appropriately treated and disposed of at a permitted landfill site or the soil can be regenerated using bio-remediation methods. - Runoff must be reduced by channelling water into existing surface drainage system.				
Protection of archaeological and heritage resources	6	- Alert the construction workforce of the potential existence of artefacts at the site. - Empower staff to stop works on (chance) discovery of artefacts at the site. - Cease construction on (chance) discovery of archaeological sites of heritage importance or redirect machinery away from finds until an archaeologist is able to make a site inspection and establish the importance of the find and make recommendations for preservation and/or record keeping. - Report the presence of graves or human remains, fragments of fossil bone, ostrich egg and stone fragments to HWC. - Obtain a permit for the removal of artefacts from the site if any are discovered during construction.	All Contractors/Joburg Water	- Before Construction commences - During earthworks	Visual inspection	- Discovery of possible archaeological material - Rescue and reporting of identified material when discovered
Protection of paleontological resources	7	Identify a stand-by palaeontologist to inspect fossils if they are discovered during construction activities.	Johannesburg Water	Prior commencement	Visual inspection	Discovery of possible

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		- Empower staff to stop works on (chance) discovery of fossils at the site. - Alert the construction workforce of the potential existence of fossils at the site. - Cease construction on (chance) discovery of fossils and artefacts of paleontological importance or direct machinery away from finds until the identified palaeontologist is able to make a site inspection and establish the importance of the find and make recommendations for preservation, collection or record keeping.	All Contractors	During earthworks		archaeological material. Rescue and reporting of identified material when discovered.
Concrete / cement Work/Batching plant	8	- Use Ready-Mix concrete rather than batching where possible. - Ensure that no cement truck delivery chutes are cleaned on site. Cleaning operations are to take place off site at a location where wastewater can be disposed of in the correct manner. If this is not possible a suitable washing facility is to be developed on site in consultation with the ECO. - Concrete must be mixed only in an area demarcated for this purpose, ideally on an impervious surface (e.g., cement mixing pit). - Batching operations to take place in a designated area, which will be kept clean at all times. - All concrete spilled outside this area, must be promptly removed by the Contractor and taken to a permitted waste disposal site. - After all concrete mixing is complete; all waste concrete must be removed from the batching area and disposed of at an approved dumpsite. - Ensure separation of clean and dirty water from batching plant.	All Contractors	Throughout construction	Visual inspection and JW EO/ECO approval.	- Number of incidents of batching outside works footprint. - Contamination of water and soil; and - Visible litter / waste on site.

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		- Storm water must not be allowed to flow through the batching area. Water laden with cement must be collected in a retention area for evaporation and not allowed to escape the batching area. - Operators must wear suitable safety clothing. - Wastewater from batching operations to be suitably disposed of. - Waste concrete and cement sludge to be removed on a regular basis (to prevent overflowing) and to be disposed of at a suitable facility. - Unused cement bags will be stored in an area not exposed to the weather and packed neatly to prevent hardening or leakage of cement. - Used cement bags will be stored so as to prevent windblown dust and potential water contamination. Used bags will be disposed of adequately at a licenced waste disposal facility. - Limit concrete batching to single sites where possible. - Concrete transportation will not result in spillage. - Cleaning of equipment and flushing of mixers will not result in pollution, with all contaminated wash water entering the wastewater collection system. - To prevent spillage onto roads, ready mix trucks will rinse off the delivery shoot into a suitable sump prior to leaving the site. The Contractor shall ensure such designated concrete wash bay area's/ sumps are created and that all concrete trucks delivering concrete to site first empty and clean their shoots at this point before leaving the site. The dried waste product shall be handled as construction rubble.				

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		- Suitable screening and containment will be in place to prevent windblown contamination from cement storage, mixing, loading and batching operations. - All contaminated water and fines from exposed aggregate finishes will be collected and stored in sumps and will be adequately disposed of. - All visible remains of excess concrete will be physically removed on completion of the plastering or concrete pouring and disposed of in an acceptable manner. - Any spilled concrete to be cleaned up immediately. - In practice all wastes arising from construction activities are to be handled; transported and disposed of in accordance with the relevant regulations. All efforts should be made to minimise, reclaim or recycle waste, and failing that, dispose of it in a manner licensed by the government for that purpose.				
Water Management	9	- Con serve water wherever possible (e.g., ensure that areas are not watered excessively, and all leaking pipes are replaced and repaired immediately). - Adequate erosion, runoff and sedimentation prevention, control and mitigation measures must be instituted at all sensitive areas, such as embankments, slopes, river crossings/watercourses/drainage lines, wetlands, when excavations or disturbance occurs within these areas, within the buffers, beds, and banks. - These control measures must include use of silt fences/traps, sandbags, retention of vegetation, berms, immediate replacement of vegetation. Additionally, reno mattresses, riprapp, stone pitching,	All Contractors	Throughout construction/post construction	Visual inspection	- Incidence of storm water contamination. - Visible leaks/ water wastage. - And Visible surface erosion.

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		gabions, use of geotextiles) e.g., biojute must be used at the direction of the JW Engineer. • Adequate sedimentation control measures must be instituted at any river crossings when excavations or disturbance of a riverbanks or riverbeds takes place. • Adequate sedimentation control measures must be implemented where excavations or disturbance of drainage lines of a wetland may take place. • All fuel, chemical, oil, etc. spills must be confined to areas where the drainage of water can be controlled. Use appropriate structures and methods to confine spillages such as the construction of berms and pans, or through the application of surface treatments that neutralise the toxic effects prior to the entry into a water course. • The drip trays and spill kits must be used to contain oil from spilling into the water. Ensure adequate drip trays are available. • During construction through a wetland or watercourse, the majority of the flow of the wetland should be allowed to pass downstream. • Vehicular traffic across wetland and watercourse areas must be avoided. • No dumping of foreign material in streams, rivers and/or wetland areas is allowed. • The wetland area and/or river must not be drained, filled or altered in any way including alteration of a bed and/or, banks, without prior consent from the DWS. The necessary licenses must be obtained in terms of Section 21 and 22 of the National Water Act, 36 of 1998 from DWS. • No fires or open flames are allowed in the vicinity of the wetland, especially during the dry season.				

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		- No swimming, washing (including vehicles and equipment), fishing or related activity is permitted in a wetland or river. - Disturbances to nesting, breeding and roaming sites of animals in or adjacent to wetland areas must be minimized. - Portable Water shall be the last resort info dust suppression on site.				
Air Pollution	10	- Speed limits must be implemented in all areas, including public roads and private property to limit the levels of dust pollution. - Dust must be suppressed on access roads and construction sites during dry periods by the regular application of water or a biodegradable soil stabilisation agent. Water used for this purpose must be used in quantities that must not result in the generation of run-off. - Where possible the use of potable water should be minimised for dust suppression purposes, preferably recycled or reused water. - The site-specific investigation will quantify the impact of dust on nearby wetlands, rivers and dams in terms of sedimentation. Mitigation measures identified during the site-specific study must be implemented. - The Contractor must notify the principal of all schools within 50m of the site of proposed activities. The principal must in turn ensure that children with allergies and respiratory ailments take the necessary precautionary measures during the construction period. The Contractor must ensure that construction activities do not disturb school	All Contractors	Throughout construction	Visual inspection	Visible air pollution.

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		activities e.g., dust clouds may reduce visibility affecting sports activities. - Waste must be disposed of, as soon as possible at a municipal transfer station, skip or on a permitted landfill site. Waste must not be allowed to stand on site to decay, resulting in malodours. - Noise control measures must be implemented. All noise levels must be controlled at the source. All employees must be given the necessary ear protection gear. IAP's must be informed of the excessive noise factors. - The Contractor must inform all adjacent landowners of any after-hour construction activities and any other activity that could cause a nuisance e.g., the application of chemicals to the work surface. Normal working hours must be clearly indicated to adjacent landowners. - No loud music is allowed on site and in construction camps. - No fires are allowed if smoke from such fires will cause a nuisance to IAPs.				
Social and cultural	11	- Access by non-construction people onto any construction sites must be restricted. The Contractors activities and movement of staff must be restricted to designated construction areas only. - The Contractors crew must be easily identifiable due to clothing, identification cards or other methods. - Rapid migration of job seekers could lead to squatting and social conflict with resident communities and increase in social pathologies if not properly addressed. The Contractor must ensure that signs indicating the availability of jobs are installed.	All Contractors	Throughout construction	Visual inspection	- Community complaints. - Complaints register. - Daily environmental inspection

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	• Criteria for selection and appointment (by the Contractor) of construction labour must be established to allow for preferential employment of local communities. The Local Authority must be actively involved in the process of appointing temporary labourers. • Sub-Contractors and their employees must comply with all the requirements of this document and supporting documents e.g., the Contract document that applies to the Contractor. Absence of specific reference to the sub-contractor in any specification does not imply that the sub-contractor is not bound by this document. • No member of the construction workforce is allowed to wander around private property, except within the immediate surroundings of the site. • The Contractor must provide suitable sanitation facilities for site staff. Sanitation provided during the construction phase should be managed so that it does not cause environmental health problems. The use of the surrounding veld for toilet purposes is not permitted under any circumstance. • The Contractor must arrange for all his employees and those of his sub-contractors to be informed of the findings of the environmental report before the commencement of construction to ensure: • A basic understanding of the key environmental features of the work site and environments, and • Familiarity with the requirements of this document and the site-specific report. • Supervisory staff of the Contractor or his sub-contractors must not direct any person to undertake any activities which would place such person in				

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		contravention of the specifications of this document endanger his/her life or cause him/her to damage the environment. - The demand for construction materials and supplies will have an effect on the local economy. This impact can be optimised by sourcing and purchasing materials locally and regionally wherever possible, insofar as the material complies with the design specification. - The Contractor must maintain a detailed complaints register. This must be forwarded, together with solutions, to the authorities when requested.				
Aesthetics	12	- Scenic Quality - Damage to the natural environment must be minimized. - The contractor may not remove any trees. If trees are in the way of the pipe route or with the development sites, the contractor must inform the environmental section who will then liaise with city parks for permission or recommendation. - Trees and tall woody shrubs must be protected from damage to provide a natural visual shield. Excavated material must not be placed on such plants and movement across them must not be allowed, as far as practical. - The clearing of all sites must be kept to a minimum and surrounding vegetation must, as far as possible, be left intact as a natural shield. - No painting or marking of natural features must be allowed. - Above-ground Structures (reservoirs, water hammer tanks, valve chambers, pump stations etc.)	All Contractors	Throughout construction	- Visual inspection. - Way-leaves	- Daily inspection - Environmental incident.

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		- All above ground structures should be located in areas where the visual impact from roads, houses etc. is minimised. - All above ground structures could be treated or painted to blend in with the natural environment. - Cut and fill areas, river and stream crossings and other soil stabilisation works must be constructed to blend in with the natural environment. - Natural outcrops, rocky ridges and other natural linear features must not be bisected. Vegetation on such features must, as far as possible, not be cut unless absolutely necessary for construction. - Excavated material must be flattened (not compacted) or removed from site. No heaps of spoil material must be left on site once the Contractor has moved to a new construction site. - Any complaints from IAP's regarding the appearance of the construction site must be recorded and addressed promptly by the Contractor.				
Fauna and Flora	13	Flora - All suitable and rare flora and seeds must be rescued and removed from the site. They must be suitably stored, for future use in rehabilitation. - The felling and/or cutting of trees and clearing of bush must be minimised. - Bush must only be cleared to provide essential access for construction purposes. - The spread of alien vegetation must be minimized. - Any incident of unauthorised removal of plant material, as well as accidental damage to priority plants, must be documented by the Contractor. - Woody vegetative matter stripped during construction must either be spread randomly	All Contractors	Throughout construction	- Visual inspection - Way-leave from City Parks. - Biodiversity permit from Gauteng Department of Rural and Development	- Environmental incident register - Daily inspection - Number of environmental incidents. - Fauna and flora removal and relocation register

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		throughout the surrounding veld to provide biomass for other micro-organisms and habitats for small mammals and birds, or it may be stockpiled for later redistribution over the reinstated top soiled surface. No vegetative matter must be burnt or removed for firewood other than those removed during the grubbing and clearing phase. Such vegetation can be made available to the local inhabitants to be used as firewood. - No tree outside the footprint of the Works area must be damaged. Fauna - No species of animal may be poached, snared, hunted, captured, or wilfully damaged or destroyed. - Snakes and other reptiles that may be encountered on the construction site must not be killed unless the animal endangers the life of an employee. - Anthills and/or termite nests that occur must not be disturbed unless it is unavoidable for construction purposes. - Disturbances to nesting sites of birds must be minimized. - The Contractor must ensure that the work site is kept clean and free from rubbish, which could attract pests.				
Infrastructure	14	- The relevant authorities must be notified of any interruptions of services, especially the Local Municipality, National Road Agency, Transnet, TELKOM, and ESKOM. In addition, care must be taken to avoid damaging major and minor pipelines and other services. - The integrity of property fences must be maintained.	All Contractors	Throughout construction	- Visual inspection - Wayleaves from different entities.	- Incident register. - Permit/ Way-leave register - Complaints register.

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		- No telephone lines must be dropped during the construction operations, except where prior agreement by relevant parties is obtained. All crossings must be protected, raised or relocated as necessary. - All complaints and/or problems related to impacts on man-made facilities and activities must be promptly addressed by the Contractor and documented. - Proper storage facilities should be provided for the storage of oils, grease, fuels, chemicals and hazardous materials. - The Contractor must ensure that accidental spillage does not pollute soil and water resources. - Fuel stock reconciliation must be done on all underground tanks to ensure no loss of oil, which could pollute groundwater resources. - Cement must be stored and mixed on an impermeable surface. - The Contractor shall ensure that existing services (e.g., roads, pipelines, and power lines and telephone services) are not damaged or disrupted unless required by the contract and with the permission of the RE. - The Contractor shall be responsible for the repair and reinstatement of any existing infrastructure that is damaged or services which are interrupted. - A time limit for the repairs may be stipulated by the RE in consultation with the Contractor.				
Blasting	15	- Blasting must not endanger public or private property. - Noise mufflers and/or soft explosives must be used to minimize the impact on animals.	All Contractors	Throughout construction	Visual inspection/ Engineer report	- Incident register. - Complaints register.

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		- All the provisions of the Explosives Act, 26 of 1956 and the Minerals Act, 50 of 1991 must be complied with. - The Contractor must take measures to limit fly rock. - Certificate of competence. In file - Blasting permit must be obtained from the South African police station issued in terms of section 9 of explosive Act, Act 26 of 1956) prior blasting. - Method statement for drilling and blasting (NB: Submitted for acceptance before any works) in file - Provide the MSDS's for the chemicals are to be used. - Proof of notification to the affected community. - The Appropriate PPE.				Permit register.
Workshops, storage areas and materials handling	16	- These areas shall be chosen so as to cause the least impact on the biophysical and social elements of the area. - The siting of workshops, maintenance and refuelling sites and materials storage areas shall not be in the vicinity of sensitive sites e.g., wetlands, cultivated fields or drainage lines, or where local landowners can be disturbed. - Storm water shall be diverted around the storage area. Storm water falling on the storage area shall be discharged if it meets the required water quality standards. - Proper storage facilities, placed on an impermeable surface, shall be provided for the storage of oils, grease, fuels, chemicals, and other hazardous materials to be used during the construction phase of the project. If fuel is required on site, it shall be stored in a secure area in a steel tank supplied and	All Contractors	Throughout Construction	- Visual inspection - Method statement for handling hazardous substances. - MSDS	- Hazardous substances register. - MSDS file - Spill register - Incident register.

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		maintained by the fuel suppliers. Leakage of fuel shall be avoided. • An adequate bund wall, 110% of volume, shall be provided for fuel and diesel areas to accommodate any spillage or overflow from these substances. The area inside the bund wall shall be lined with an impervious lining to prevent infiltration of the fuel into the soil. • In addition, hazard signs indicating the nature of the stored materials shall be displayed on the storage facility or container and Material Safety Data Sheets (MSDS's) will be made available for all hazardous chemicals. Before containers or storage facilities are erected, emergency procedures in the event of misuse or spillage that may negatively affect an individual or the environment will be in place. • The storage facilities (including any tanks) shall be surrounded by a bund wall, in order to ensure that accidental spillage does not pollute local soil or water resources. • The storage areas shall not be utilised for accommodation purposes and shall be access controlled. • The storage area shall be kept tidy, and the area shall be rehabilitated after use. • An inventory of any hazardous chemicals/substances (including that within equipment) kept on site, along with a description of possible ill effects and treatment of health-related afflictions resulting from accidents, shall be kept in the storage area as well as by the appropriate manager. These areas shall be securely fenced.				

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		• Gas welding cylinders and LPG cylinders shall be stored in a secure, well-ventilated area. • A notice board with the contact details of the responsible party shall be displayed at the gate to the storage area. • The contractor shall ensure that any delivery drivers are informed of all procedures and restrictions required to comply with the EMP. Someone with an adequate understanding of the CEMP shall supervise drivers during delivery and off-loading. • All vehicles and machinery will be inspected for any leaks or malfunctions regularly. Vehicle servicing or repairs is prohibited from site, unless in an emergency. • Drip trays shall be inspected and emptied daily and serviced when necessary. In particular drip trays shall be closely monitored during rain events to ensure that they do not overflow. The contents must be disposed of at a recognised site. • All repairs done on machinery using hydrocarbons as fuels or lubricants shall have a drip tray placed strategically to avoid incidental spillage. • Workers shall be made aware of the health risks associated with any hazardous substances used (e.g., smoking near refuelling depots), and shall be provided with appropriate protective clothing / equipment in case of spillages or accidents. • Cement and other potential environmental pollutants shall be stored and mixed on plastic sheeting or ready-mix trucks shall be used. There shall be no opportunity for environmental contamination.				

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		- Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediate to the satisfaction of the EO. - The Contractor shall be in possession of an emergency spill kit that must be always complete and available on site.				
Waste Management	17	Methods for waste management and waste minimisation shall be implemented from the outset of the contract as per the Waste Management Plan to be submitted to Client. All personnel shall be instructed to dispose of all waste in the proper manner. A waste avoidance and minimisation approach will be encouraged for the duration of the project. The following steps in order will be applied. - Prevention – avoid and minimise waste - Recycle – reuse and recover all general waste - Treat – treatment to reduce toxicity reduce waste quantities - Dispose – waste removal into a registered landfill facility Solid waste Waste with the potential for market re-use will be stored in separate containers, this includes, scrap metal, used tyres and paper. This waste will be recycled wherever possible. Solid waste shall be temporarily stored in tip – poof metal drums or waste skips at an approved area on site for collection and disposal. This area shall be away from drainage lines or water courses. - All general waste drums or skips will be appropriately labelled GENERAL WASTE	All Contractors	Throughout Construction	- Visual inspection/Environmental inspection checklist. - Legal Documents: Transport certificate obtained from GDARD for transporting general or hazardous waste. - Transport certificate obtained from City of Johannesburg for transporting general waste within COJ. - Waste manifest/	- Littering - Soil contamination - Water pollution.

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		- A refuse control system shall be established for the collection and removal of refuse to the satisfaction of Client and ECO. - No waste shall be burned at the site offices or anywhere else on the site. - All building rubble shall be a) removed from the site and disposed of at an appropriate dumping site, or b) temporarily stored in a clearly demarcated area on site for future use. - All waste shall be disposed at an appropriate waste disposal facility. Litter - No littering by construction workers shall be allowed. During the construction period, the facilities shall be maintained in a neat and tidy condition and the site shall be kept free of litter. - Measures shall be taken to reduce the potential for litter and negligent behaviour with regard to the disposal of all refuse. - Littering, discarding or burying of any materials shall not be allowed on site. Hazardous waste - Hazardous waste shall be temporarily stored in tip – poof metal drums or waste skips at an approved area on site for collection and disposal. This area shall be away from drainage lines or water courses. - All hazardous waste drums or skips will be appropriately labelled.			waste disposal certificate/ weighbridge slip.	

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		- Hazardous waste must not be temporary stored on site for a period exceeding 90 days as per the National Environmental Management Waste Act (Act 59 of 2008) as amended in 2014) (Schedule 19 (2)). HAZARDOUS WASTE. - Hazardous waste such as bitumen, tar and oil shall be disposed of at a registered waste disposal facility. Special care shall be taken to avoid spillage of tar products such as tar prime or pre-coating fluid to avoid water-soluble phenols from entering the ground or contaminating water. - All used filter materials shall be stored in a secure bin for disposal off site. Any contaminated soil shall be removed and replaced with clean soil. Soil contaminated by oils and lubricants shall be collected and disposed of at a facility designated by the local authority to accept contaminated materials. - Used oil, lubricants, and cleaning materials from the maintenance of vehicles and machinery shall be collected in a holding tank and returned to the supplier. Water and oil shall be separated in an oil trap. Oils collected in this manner shall be retained in a safe holding tank and removed from site by a specialist oil recycling company for disposal at an approved hazardous waste disposal site. Oil collected by a mobile servicing unit shall be stored in the service unit's sludge tank and discharged into the safe holding tank for collection by the specialist oil recycling company. - Sludge should be managed in accordance with the Sludge Guideline 2010.				

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		- Sludge should be kept only at the drying bed and no sludge should be stored at a permeable ground or natural ground. - Hazardous waste shall be disposed of at a registered hazardous waste disposal site, disposal certificates shall be kept in the site file for record. Medical Waste - All medical waste will be contained in the special bins provided. All sharp needles must be separated from other medical waste, - All outdated and disused medicines will be disposed of as a hazardous medical waste or returned to the supplier for disposal. (Tablets and syrups will be crushed and/or dissolved before disposal as hazardous waste), - Medical waste used on personnel coming for treatment at the clinic are to be placed on a demarcated container storage room, - The Occupational Health Nurse (OHN) will notify a service provider for removal of the medical waste prior exceeding 90 days. - The service provider to provide Waste Manifest as well as the Safe Disposal Certificate, to the OHN who will maintain the copies of the waste manifest and safe disposal certificate. - The OHN will arrange for an approved hazardous waste disposal company to collect and dispose of this medical waste. The OHN is responsible for and authorised to keep all records in connection herewith (disposal certificates).				

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Ablution facilities	18	• Provide ablution facilities (i.e., chemical toilets) for all site staff at a ratio of 1 toilet per 15 workers (absolute minimum 1:25). • Secure all temporary/portable toilets to the ground within the Site Camp to the satisfaction of JW EO/ECO to prevent them toppling due to wind or any other cause. • Maintain toilets in a hygienic state (i.e., toilet dispensers to be provided, toilets to be cleaned and serviced regularly (by registered appropriate waste contractor), and toilets to be emptied before long weekends and builders' holidays). • Remove/ appoint an appropriate supplier to remove accumulations of chemicals and treated sewage from the site and dispose of at an approved waste disposal site or sewage plant. • Ensure that no spillages occur when the toilets are cleaned or emptied. Repeated incidents of spillage of chemicals and or waste (i.e., more than one incident), will require toilets to be placed on a solid base with a sump. • Ablution facilities must be located at least 50m from any watercourse. • Ablution facilities shall be provided on site. • The positioning of the ablution facilities shall be done in consultation with Client and shall be placed so that it cannot contaminate the natural streams and rivers. One toilet shall be provided per 10 staff members on site. Toilets shall be positioned within walking distance of wherever employees are employed on the site. Toilets shall be provided with locks and doors shall be secured to prevent the toilets from blowing over.	All Contractors	Throughout construction	• Visual inspection • Records of waste manifest/disposal certificates/ weighbridge slip	• Incidence of staff not using Facilities • Incidence of pollution

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	• The toilets shall be placed outside of areas susceptible to flooding. • Chemical toilets shall be serviced regularly by an authorised service provider and removed to a registered wastewater treatment works and disposal certificates shall be obtained from the waste disposal facility for each disposal and retained on site. • Polluted run-off must be discharged in the local sewerage main and not overland or into public streams. In instances where a sewerage main is not available, polluted run-off will be collected in sub-surface tanks and a reputable effluent removal contractor will be contracted to dispose of the waste in an environmentally acceptable manner. Official documentation shall be obtained from the waste disposal facility for each disposal and retained on site. • Toilets situated close to the site boundaries or within sight of residential areas shall be hidden behind screens or other cover as approved by the Engineer. • Discharge of waste from toilets into the environment and burial of waste is strictly prohibited. • Only flushable toilets should be utilised on site. • If the Ablution facilities are to be connected to the Municipal sewer line, method statement and a letter for municipal tax and rates should be submitted to JW Environmental section and responsible Depot for approval. • A letter or agreement for disposing waste must be obtained from the applicable WWTW; this must be provided by service provider. Waste manifests, disposal certificates and service certificates are				

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ENVIRONMENTAL MANAGEMENT PLAN

		required; these must be provided by service provider. The contractor shall not appoint service providers who do not have registration certificates with GDARD and CoJ for transporting hazardous (and general waste), and copies of permits for landfills, and agreement letter from WWTW, to be used for disposals. The contractors themselves are encouraged to register as general and hazardous waste transporters, and open accounts with Pikitup, so disposal slips may be obtained.				
Access road and traffic control	19	Access Roads - The Contractor and the affected landowner must collaborate on the planning and construction of new access routes and the repair or upgrading of existing routes. - Access to the site must be controlled such that only vehicles and persons directly associated with the work gains access to the site. - Temporary access roads must not be opened until required and must be restored to its former state as soon as the road is no longer needed. Traffic Control - All reasonable precautions must be taken during construction to avoid severely interrupting the traffic flow on existing roads, especially during peak periods. - Before any work can start the Local Traffic, Department must be consulted about measures to be taken regarding pedestrian and vehicular traffic control and obtain proper road signage's	All Contractors	Throughout construction	- Method statement for access road and traffic control. - Way-leave	- Daily Inspection checklist. - Environmental incident. - Incident register.

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Electrical	20	- Measures must be taken during thunderstorms to protect workers and equipment from lightning strikes. - All tall structures must be properly earthed and protected against lightning strikes.	All Contractors	Throughout construction	- Permit - OHS approval letter - Wayleave	- Approval letter - Electrical certificate
Development Footprint	21	- The development footprints and disturbed areas surrounding the proposed project infrastructure should be kept at minimum as possible and the areas cleared of natural vegetation and topsoil must be kept to a minimum. - The extent of all development footprint areas and permanent/ temporary structures must be limited to what is essential. - As far as possible, existing roads are to be utilised, to limit cumulative impacts from roads and traffic. - The height of any temporary structures such as topsoil stockpiles should be kept as low as possible below 1m.	All Contractors	Throughout construction	- Agreement letter. - Wayleave	- Incident register. - Complaints register.
Fire Prevention	22	- The Contractor must take all the necessary precautions to protect the materials on site and to avoid veld fires. - No fires or open flames are allowed on site unless directly used for construction purposes, - Review all SANS standards relating to fire precautions and fire control namely, SANS 0131-3 Section 8 and SANS 089-1 or as amended. - The Contractor must have fire-fighting equipment and a first aid box available on site and on all vehicles working on site. - All waste bins must be kept away from fuel tank installations.	All Contractors	Throughout construction	- Visual inspection - Emergency Response Plan.	- Fire extinguisher inspection checklist. - Incident register - Mock drill report.

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ENVIRONMENTAL MANAGEMENT PLAN

		- All fuel tanks must be installed above ground, depending on the volume of stored fuel, for easy detection of fuel leaks. - Any welding or other sources of heating of materials must be done in a controlled environment, wherever possible and under appropriate supervision, in such a manner as to minimise the risk of veld fires and/or injury to staff. - Fires lit for comfort (warmth) must be actively discouraged by the Contractor, due to the risk of veld fires and the risk to adjacent properties. Also, no waste material must be burnt.				
Noise Pollution	23	- Temporary noise pollution due to construction works should be controlled by proper maintenance of equipment and vehicles and tuning of engines and mufflers. Construction works should be completed in as short a period as possible by assigning qualified engineers and foremen. - It is the responsibility of the Contractor to monitor for the mitigation of such impacts. Noise problems should be reduced to normally acceptable levels by incorporating low-noise equipment in the design and/or locating such mechanical equipment in properly acoustically lined buildings or enclosures. In the presence of adequate buffer zones between the facility and residential areas, noise control measures must be minimized.	All Contractors	Throughout Construction	Random noise measurements	- Results of random noise measurements - Number of registered complaints
Complaints	24	Maintain complaints register for all complaints. The register must list: - Complainant name and contact details. - Date complaint was lodged. - Person who recorded the complaint. - Nature of the complaint.	All Contractors	Throughout construction	Complaints register	- Availability of register on site - Designated person to maintain register

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		• Actions taken to investigate the complaint and outcome of the investigation. • Action taken to remedy the situation. • Date on which feedback was provided to complainant.				• Complaints logged • Complaints followed up and Closed out.
Housekeeping	25	• All construction and operational areas must be kept in a neat and orderly condition at all times. • An efficient removal system of waste and rubble must be ensured during all development phases. • All operational facilities, including vehicles, should be actively maintained. • Any areas for material storage, waste sorting and other potentially intrusive activities must be screened from view as far as considered feasible. • Regularly inspect all construction machinery and holding tanks for leaks or damages. • Place generators on drip trays. • Repair any defects as soon as possible. In the case of leaks, ensure that the leaking water or effluent is captured and not released into the environment. • Service and refuel equipment that uses hydrocarbon fuels, oils, lubricants, and other hazardous chemicals at the designated area at the Site Camp only under conditions approved by JW EO/ECO • Ensure that absorbent pads (or equivalent) and/ or drip trays are available to collect any oil, fluid, etc. in the case of a breakdown or emergency repair outside the designated area. Keep a copy of fuels and hazardous substance inventory on site. • Keep spill containment and clean-up equipment at all work sites and for all polluting materials used at the site.	All Contractors	Throughout	Visual inspection of site camp/ construction site	Regular inspection reports by SHE Officer and JW EO

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ENVIRONMENTAL MANAGEMENT PLAN

		- Prevent discharge of any hazardous substances or pollutants, such as cements, concrete, chemicals, and other contaminated wastewater and fuels into the ground, surface, or storm water systems on site. - Control litter and keep construction areas as clean and neat as possible.				
Transportation and refuelling	26	- Undertake regular maintenance of vehicles and machinery to identify and repair minor leaks and prevent equipment failures. - Undertake any on-site refuelling and maintenance of vehicles/machinery in designated areas. Line these areas with an impermeable surface and install oil traps. - Ensure that oils and lubricants used for maintenance of equipment in the field are correctly contained. - Use appropriately sized drip trays for all refuelling and/or repairs done on machinery – ensure these are strategically placed to capture any spillage of fuel, oil, etc. - Use drip trays under all equipment and plants that are parked overnight or for long periods. - Store and handle fuels, oils and chemicals so as to avoid the risk of spillage, i.e., in waterproof and impervious	All Contractors	Throughout Construction	Visual inspection of vehicles, barges, machinery and refuelling / maintenance areas	- Incidence of non-compliance - Incidence of leaks and spills - Cost of cleaning up spills
Safety and Security	27	- Do not allow any open fires on the site. - Do not allow smoking on the site except within designated areas. Suitable fire-fighting equipment must be readily available in these areas. - Equip all fuel stores and waste storage areas with fire extinguishers.	All Contractors	Throughout construction	- Inspect attendance register for training sessions - Inspect fire extinguishers	- Number of fire incidents - Certified extinguishers in appropriate locations

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ENVIRONMENTAL MANAGEMENT PLAN

		- Ensure that all personnel on site are aware of the location of fire-fighting equipment on the site and how the equipment is operated. - Suitably maintain fire-fighting equipment. - Ensure that emergency procedures (in relation to fire, spills, contamination of the ground, accidents to employees, use of hazardous substances, etc.) are established prior to commencing construction. - Make all emergency procedures available, including responsible personnel, contact details of emergency services, etc. to all the relevant personnel. Clearly demarcate emergency procedures at the relevant locations around the site. - Secure the Site Camp, particularly to restrict - Unauthorised access to fuels and other hazardous substances. - Provide suitable emergency and safety signage on site and demarcate any areas which may pose a safety risk (including hazardous substances, deep excavations, etc.). - Advise the ECO of any emergencies on site, together with a record of action taken.	All Contractors	Before and during construction	and certificates Visual inspection	Number of safety / emergency incidents.
Response to environmental pollution	28	- In the event of environmental pollution, e.g., through spillages, immediately stop the activity causing the problem. - Maintain relevant Material Safety Data Sheets (MSDS) at the site for all potentially hazardous substances (as defined in the regulations for hazardous chemical substances). In the event of an emergency, procedures detailed in the MSDS shall be followed. Clean up any spills immediately, through containment and removal of free product and appropriate disposal of contaminated soils.	All Contractors	Throughout construction	- Maintain register of pollution events and response - Following resumption of activities, frequently inspect repaired	- Number of incidents - Time activities stopped - Number of recurring Incidents - Availability and completeness of register

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		• Immediately remediate and rehabilitate areas in the event of a spill of an environmentally hazardous substance. • Only resume activity once the problem has been stopped or (in the case of spillages) the pollutant can be captured without reaching the environment. Repair faulty equipment as soon as possible. • Treat hydrocarbon spills, e.g., during refuelling, with adequate absorbent material, which then needs to be disposed of at a suitable landfill. • Ensure a quantity of appropriate remedial agent, capable of containing and/or remediating a hydrocarbon spill is available on site at all times in case of an emergency spill. The material shall be capable of handling a spill of at least 200l. • Report all fuel, oil or hydraulic fluid spills to the JW EO/ECO so that appropriate clean-up measures can be implemented. • Report all incidents within 24 hours to JW environmental section. • All environmental incidents must be investigated within seven (7) working days.			equipment to ensure proper functioning	
Storm Water Management	28	Objective • To minimise erosion of soil from site during construction. • To minimise deposition of soil into drainage. • Minimise loss of vegetation cover due to construction related activities. Mitigation Measures • Identify and demarcate construction areas for general construction work and restrict construction activity to these areas. Prevent unnecessary	All Contractors	Throughout Construction	• Visual inspection. • Storm water management Plan. • Way-leave from JRA	• Daily inspection checklist. • Incident register.

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		destructive activity within construction areas (prevent over-excavations) • Stockpile topsoil for re-use in rehabilitation phase. Maintain stockpile shape and protect from erosion. All stockpiles must be positioned at least 50 m away from drainage lines and wetlands. • Erosion control measures: Run-off control and attenuation on slopes (sandbags, logs), silt fences, storm water channels and catch-pits, shade nets, soil binding, geofabrics, hydro seeding or mulching over cleared areas. • Control depth of excavations and stability of cut faces/sidewalls. • Compile a comprehensive storm water management plan as part of the final design of the project and implement during construction and operation.				
Re-vegetation, Rehabilitation, Reinstatement	29	Objective To ensure re-vegetation and rehabilitation of disturbed areas is undertaken Legislation and Standards Conservation of Agricultural Resources Act (Act 43 of 1983) Environment Conservation Act (Act 73 of 1989) National Forestry Act (Act 84 of 1998) National Environmental Management Act 107 of 1998 and Gauteng Nature Conservation Bill, 2014. Mitigation measures In order to meet this goal, the following objective, actions, and monitoring requirements are relevant: • Disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local	All Contractors	Throughout Construction	• Rehabilitation Plan • JW EMP • Visual inspection • Ecologist Specialist report • Environmental Authorisation/ GA • Practical and completion certificate.	• Daily inspection checklist. • Rehabilitation report • Waste management collection report (Waste Disposal Certificate).

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		seed mix. Re-use native/indigenous plant species removed from disturbance areas in the rehabilitation phase as per the re-vegetation and rehabilitation management plan. • Alien/non-native species must not be used. If these are requested/ required by stakeholders, then this must be documented by contractor. • Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved. • On-going alien plant monitoring and removal within the disturbed project footprint (where the initial clearing for construction took place) must be undertaken on all areas of natural vegetation on an annual basis. • All temporary facilities, equipment and waste materials must be removed from site and appropriately disposed of. • All temporary access road must be rehabilitated to their original condition • Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion. • On-going inspection of rehabilitated areas to determine effectiveness of rehabilitation measures implemented. • On-going alien plant monitoring and removal should be undertaken as per the approved Rehabilitation/Re-vegetation plan. Management and Mitigation Requirement • Conduct a detailed search of at the area. As a minimum, this should take place during the			• Community Happy Letters.	

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		spring and summer months prior to impoundment so positive identification of flowering plants can be made. This should be done taking due cognisance of specialist studies already undertaken as part of the EIA process; • Allow time for additional searches if these are deemed necessary, based on progress and diversity of plant species found; • Identify and physically mark all conservation worthy plants found on the ground; and • Capture markers and reference in a retrievable system, so that these can be located again for transplanting (e.g., using a combination of aerial photography, GPS, and GIS, as appropriate).				
Practical and Final completion inspection	30	• Ensure that practical inspection is conducted before the Contractor hands over the project back to JW in order to ascertain if the reinstatement or rehabilitation has been done accordingly. • The snag list is to be compiled and accepted by all parties (JW CAPEX Representatives, JW environmental section as applicable, and appointed Contractor) All responsible personnel including Environmental representative sign both practical and final completion letter.	CAPEX/ OHSE& DM/ All Contractors	During the final stage of project	• Meeting invite • Visual inspection	• Meeting invite • Attendance register • Snag list • Signed practical and final completion inspection letter.
Final close out report	31	• Conduct final audit on site. • EO must ensure that audit reports are signed by RE/Engineer and Contractor. • Environmental File is returned to JW, after rehabilitation has been deemed successful.	OHSE & DM	During the final stage of project.	• Final audit report. • Signing of Audit reports.	• Final Audit report. • Signed Audit report. • Environmental file.

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Table 3: Environmental Management and Mitigation Measures that must be implemented during the Operational Phase

Operational Phase Measures						
Aspects	ID	Mitigation Measure/Procedure	Responsible	Implementation Timeframe	Monitoring Methods	Performance indicators
Waste Management	1	Sanitation Facilities - Ablution facilities shall be provided on site. - The positioning of the ablution facilities shall be done in consultation with Client and shall be placed so that it cannot contaminate the natural streams and rivers. One toilet shall be provided per 15 staff members on site. Toilets shall be positioned within walking distance of wherever employees are employed on the site. Toilets shall be provided with locks and doors shall be secured to prevent the toilets from blowing over. - The toilets shall be placed outside of areas susceptible to flooding. - Chemical toilets shall be serviced regularly by an authorised service provider and removed to a registered wastewater treatment works and disposal certificates shall be obtained from the waste disposal facility for each disposal and retained on site. - Polluted run-off must be discharged in the local sewerage main and not overland or into public streams. In instances where a sewerage main is not available, polluted run-off will be collected in sub-surface tanks and a reputable effluent removal contractor will be contracted to dispose of the waste in an environmentally acceptable manner. Official documentation shall be obtained from the waste	Johannesburg Water	During operation and maintenance activities	- Visual inspection of Waste collection and disposal areas. - Visual inspection of site. - Check waste disposal slips. - Monitor activities against JW Waste Management Plan. - Waste Inventory Register.	- Presence of litter - Availability of waste bins and skips. - Degree to which rubbish bins and skips are filled - Total volume of general and hazardous waste storage capacity - Total volume of general and hazardous waste stored on site - Degree to which different waste is separated. - Frequency of waste collection. - Total volume of recycled and reused waste.

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		disposal facility for each disposal and retained on site. - Any cooking on Site shall be done on well-maintained gas cookers with fire extinguishers present. No cooking shall be permitted to occur on open fires. - Toilets situated close to the site boundaries or within sight of residential areas shall be hidden behind screens or other cover as approved by the Engineer. - No spillage shall occur when the toilets are cleaned or emptied and the contents shall be properly stored and removed from site. - Discharge of waste from toilets into the environment and burial of waste is strictly prohibited. - All building rubble and rubble from the demolished structures, solid and liquid waste must be disposed of as necessary at an appropriately licensed refuse facility. - Ensure that no refuse wastes are burnt on the premises or on surrounding premises. No fires will be allowed on site. Contaminated water - Workshops, refuelling depots and washing areas shall be bunded. - Any wastewater or spilled fuel collected within bunded areas around the refuelling area shall be disposed of as hazardous waste - Wastewater containing hydrocarbons, paints oil etc. shall be treated as hazardous waste				
Protection of Vegetation	2	Limit the footprint of the maintenance and operational activities to the minimum to minimise environmental damage.	Johannesburg Water	During operation and maintenance activities/.	Visual inspection	Incidents of vegetation damage.

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		- Designate vegetated areas outside the development footprint as “No go” areas. - Limit the off-road driving within the Johannesburg Water Sites. - Protected or endangered species of plants shall not be removed unless they are interfering with a structure. - All trees and vegetation cleared from the site shall be cut into manageable lengths. - Big trees with large root systems shall be cut manually and removed, as the use of a bulldozer will cause major damage to the soil when the root system are removed. - Stumps shall be treated with herbicide. - Protected or endangered species of plants shall not be removed unless they are interfering with a structure. - Where such species have to be removed due to interference with a structure, the necessary permission and permits shall be obtained from Provincial Department of Agriculture and Rural Development. - All protected species not to be removed must be clearly marked and such areas fenced off if required. - The use of herbicides shall only be allowed after a proper investigation into the necessity, the type to be used, the long-term effects and the effectiveness of the agent. - No scalping shall be allowed on any part of Johannesburg Water Sites.		When necessary? is		Number of incidents of disturbance of vegetation outside site boundary.
Alien invasive/weeds control	3	Some of the areas of JW area are covered with moderate to very dense invasive alien shrubs and trees. Clearing of such vegetation will be necessary	Johannesburg Water	During operation and maintenance activities	Visual inspection.	- Daily inspections register. - Incident register.

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		to gain access. However, clearing of this vegetation from the entire project area as far as possible will reduce the re-establishment rate of this vegetation over time, and will thus not only benefit the environment but also the proposed project and potential future phases of the project in the long term. • The type of invasive, however, will require regular follow-up eradication of seedlings after clearing, as extensive seedbanks of these species are present underneath present infestations. • Wood from alien vegetation can be used. However, care must be taken not to leave any of the leaf- or seed material on the site where the vegetation was cleared. Rather, identify a particular area that no longer has any indigenous vegetation, demarcate that area and dump excess material of alien species there. • Once the material is sufficiently dry, it should be burned to destroy any regenerating capacity of stems and roots as well as seeds. • Only registered PCO with Certificate for competency to handle the hazardous substances (e.g., Herbicides) is allowed to use herbicide. • Only environmentally friendly herbicide is allowed within JW sites. • MSDS for the herbicides must be kept in the storage area. • Method Statement for applying and handling herbicides and Risk Assessment for applying and handling herbicides. • Appropriate PPE for handling herbicides. • Herbicides stored only in a designated storage.			• Monitoring against Vegetation Management Plan. • PCO certificate.	

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		- Empty containers of herbicides disposed of accordingly to the registered hazardous landfill site. - Proof of disposal provided to JW Environmental Section.				
Sludge Management	4	- The sludge must be managed according to the sludge guideline. - All agreements or Contract must be placed in the file. - The sludge must be kept on a designated bunded and concrete lined drying bed.	Johannesburg Water/Bulk Waste	During operations activities	- Visual inspection according to Sludge SOP. - Monitoring against Sludge Guideline. - Monitoring against WUL.	- Sludge test report - Complaints register. - Sludge spill register. - Environmental Officers Internal WUL Audit Report.
Workshop and storage Area	5	- The siting of workshops, maintenance and refuelling sites and materials storage areas shall not be in the vicinity of sensitive sites e.g., wetlands, cultivated fields or drainage lines, or where local landowners can be disturbed. - Storm water shall be diverted around the storage area. Storm water falling on the storage area shall be discharged if it meets the required water quality standards. - Proper storage facilities, placed on an impermeable surface, shall be provided for the storage of oils, grease, fuels, chemicals, and other hazardous materials to be used during the construction phase of the project. If fuel is required on site, it shall be stored in a secure area in a steel tank supplied and maintained by the fuel suppliers. Leakage of fuel shall be avoided.	Johannesburg Water	During operations and maintenance activities	- Visual inspection - SOP for handling hazardous substances. - MSDS register	- Workshop and storage register. - MSDS register. - Incident register.

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- An adequate bund walls, 110% of volume, shall be provided for fuel and diesel areas to accommodate any spillage or overflow from these substances. The area inside the bund wall shall be lined with an impervious lining to prevent infiltration of the fuel into the soil.
- In addition, hazard signs indicating the nature of the stored materials shall be displayed on the storage facility or container and Material Safety Data Sheets (MSDS's) will be made available for all hazardous chemicals. Before containers or storage facilities are erected, emergency procedures in the event of misuse or spillage that may negatively affect an individual or the environment will be in place.
- The storage facilities (including any tanks) shall be surrounded by a bund wall, in order to ensure that accidental spillage does not pollute local soil or water resources.
- The storage areas shall not be utilised for accommodation purposes and shall be access controlled.
- The storage area shall be kept tidy, and the area shall be rehabilitated after use.
- An inventory of any hazardous chemicals/substances (including that within equipment) kept on site, along with a description of possible ill effects and treatment of health-related afflictions resulting from accidents, shall be kept in the storage area as well as by the appropriate manager. These areas shall be securely fenced.
- Gas welding cylinders and LPG cylinders shall be stored in a secure, well-ventilated area.

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		- A notice board with the contact details of the responsible party shall be displayed at the gate to the storage area. - All vehicles and machinery will be inspected for any leaks or malfunctions regularly. Vehicle servicing or repairs is prohibited from site, unless in an emergency. - Drip trays shall be inspected and emptied daily and serviced when necessary. In particular drip trays shall be closely monitored during rain events to ensure that they do not overflow. The contents must be disposed of at a recognised site. - All repairs done on machinery using hydrocarbons as fuels or lubricants shall have a drip tray placed strategically to avoid incidental spillage. - Workers shall be made aware of the health risks associated with any hazardous substances used (e.g., smoking near refuelling depots), and shall be provided with appropriate protective clothing / equipment in case of spillages or accidents. - Cement shall be mixed on a plank, metal plate or a plank only or ready-mix trucks shall be used, and other potential environmental pollutants shall be stored at the designated area. There shall be no opportunity for environmental contamination. - Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediate to the satisfaction of the EO. - The site shall be in possession of an emergency spill kit that must be complete and available at all times on site.				
Complaints	6	Maintain complaints register for all complaints. The register must list:	Johannesburg Water	During operations and maintenance activities	Complaints register.	Availability of register on site

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		- Complainant name and contact details. - Date complaint was lodged. - Person who recorded the complaint. - Nature of the complaint. - Actions taken to investigate the complaint and outcome of the investigation. - Action taken to remedy the situation. - Date on which feedback was provided to complainant.			GDARD complaints reference number.	- Designated person to maintain register - Complaints logged - Complaints followed up and closed out.
Collection of water sample	7	- Water sampling shall be undertaken at the selected sampling points as per the WUL. - Any incident or non-compliance with the WUL parameters or DWS Water Quality Guidelines shall be reported accordingly and investigated - Unused sampling bottle shall be disposed of accordingly.	Johannesburg Water/CDYNA	During operation activities	- Visual inspection. - Online Lab reports	- Daily water sample report. - Incident register.
Environmental Incident reporting and Emergency Response and Preparedness	8	NEMA Section 30 and 30A emergency incidents and situations must be reported to GDARD or DEA immediately after as an incident or situation occurs. NWA Section 20 emergency must be reported to DWS, mostly by Operations Department. This can be done via phone, fax, or email. JW must implement measures to contain the incident or situation immediately. Thereafter the Emergency Incident Report (EIR) or Emergency Situation Report (ESR) must be submitted to the authorities ASAP. The reports must provide as much information as possible, if not; the reports can be updated later as the investigation progresses. Not reporting an incident could result in the authorities issuing a directive or a compliance notice to the responsible person.	Johannesburg Water Sites	During operation and maintenance activities.	- Visual inspection. - Flash report/ Incident investigation report. - Section 30A Annexure A. - JW Environmental Emergency Preparedness	- Incident register - Bioremediation report. - Section 30A Directive. - Corrective Action Plan

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		- Important Note: For Section 30A Emergency Situation, an oral or written directive must be obtained from GDARD or DEA before works can be undertaken in the watercourse to avoid undertaking listed activities without obtaining EA. - Johannesburg Water takes responsibility in order to effectively respond to emergency incidences such as fire, hydrocarbon and sewer spills or leakages, disturbance of wildlife and archaeological artefacts. The SHE Rep must conduct daily inspections to ensure that the required equipment needed to handle environmental incidents/ emergencies are readily available and in working condition. Quick response to an incident prevents escalation to an emergency:			ess and Response Procedure.	

9. Water Management

- Water is a scarce resource and water shall be conserved wherever possible.
- Improved and protected watercourses to Class C classification which is moderately modified in terms of determined class of water resource and resource quality objectives of chapter 3 (Part 2) of National Water Act (Act 36 of 1998).
- Demand reduction/ Alternative sources.
- Building a water sensitive city.
- Well managed and maintained water infrastructure networks.

Water Usage	9.1	- The site must be kept tidy and hygienic at all times with special reference to sanitation & water management. - Maintain a monthly water usage. - Reporting of water pipe burst and damaged meters	Johannesburg Water Sites	During operation	- Visual inspection - Meter readings	Records of Monthly water Usage.
Reduce water demand	9.2	Implement effective demand-side management practices while exploring investment into smart infrastructure and alternative supplies to increase levels of net water savings.	Johannesburg Water (Network)	During operation	- Monthly Monitoring - Monthly water	- Records of percentage reduction on non-revenue water. - Records of Percentage

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		- Establish Task Team with different law enforcement agencies to develop and implement solution for infrastructure abuse problem. - Promote the implementation of Sustainable Urban Drainage System practice.			managem ent report	reduction of Rand Water system input volume.
Incentivise water saving interventions across domestic and economic sector users.	9.3	- Implementation of command-and-control base mechanism that promote water saving (CoJ By-laws). - Implementation of incentives base mechanism - Develop partnerships beyond the City to encourage water savings. - Expand current CoJ drought policy to build greater resilience of the water system. - Integrate water conservation requirements in conditions of planning approval. - Develop an awareness and communications campaign using available technology.	Johannesburg Water	CoJ/Operations	Monthly water management report	- Records of reduction in annual water consumption per capita - Water from alternative sources as % of total water supply
Rehabilitation/ Reinstatement	10	- Clean up and remove any spills and contaminated soil in the appropriate manner. - Ensure that no discarded materials are buried on site or on any other land not designated for this purpose. - Rehabilitate any disturbed areas as soon as maintenance or construction in the area is complete. - If disturbed areas are left to rehabilitate naturally, they must be frequently monitored and interventions put in place immediately should it become necessary. Special attention must be given to the potential for soil erosion and the associated environmental degradation. It is also essential to undertake alien vegetation control and management.	Johannesburg Water	During operation and maintenance activities	- EO compliance monitoring. - Visual inspection. - Compliance inspection against rehabilitation plan.	- Inspection report. - Audit report by External Auditor. - Photos before and after.

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					• JW EMP.	

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6.1 Method Statement

The objective is to ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk. The environmental specifications are required to be underpinned by a series of Method statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMPr will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to Johannesburg Water Environmental Section and ECO.

Method Statement is defined as “a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plan, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager and Environmental Officers are able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications”. The Method Statement must cover applicable details with regard to:

- Construction procedures
- Materials and equipment to be used
- Getting the equipment to and from site
- How the equipment/material will be moved while on-site
- How and where material will be stored
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur
- Timing and location of activities
- Compliance/non-compliance with the Specifications, and
- Any other information deemed necessary by the Johannesburg Water.

The Contractor may not commence the activity covered by the Method Statement until it has been approved by the Site Manager, except in the case of emergency activities and then only with the consent of the Site Manager. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract.

Failure to submit a method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved. The EO and ECO should monitor the construction activities to ensure that these are undertaken in accordance with the approved Method Statement.

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6.2 Monitoring

- Regular inspections of the site by EO/SHE and Environmental Reps
- Immediate reporting of ineffective sediment control systems.
- Public complaints register must be developed and maintained on site.

6.2.1 Monitoring Program

OBJECTIVE: Monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme must be in place not only to ensure conformance with the EMP, but also to monitor any environmental issues and impacts which have not been accounted for in the EMP that are or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the environmental authorisation (once issued). Where this is not clearly dictated, Johannesburg Water will determine and stipulate the frequency of monitoring required in consultation with the relevant authority. The contractor project manager will work with the site manager of the contractor to ensure that monitoring is conducted and reported.

The aim of the monitoring and auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

- Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications.
- Ensure adequate and appropriate interventions to address non-compliance.
- Ensure adequate and appropriate interventions to address environmental degradation.
- Provide a mechanism for the lodging and resolution of public complaints.
- Ensure appropriate and adequate record keeping related to environmental compliance.
- Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, to enhance the efficacy of environmental management on site.
- Aid communication and feedback to authorities and stakeholders.

6.2.2 Method of Monitoring

The Environmental Officer will ensure compliance with the EMP and will conduct monitoring activities. The EO will undertake site inspections monthly or as specified in the environmental authorisation once issued.

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6.2.3 Monitoring Reports

Environmental Monthly reports will be compiled by the EO monthly and must be submitted to Environmental Specialist. The report should include details of the activities undertaken in the reporting period, any non-conformances or incidences recorded, corrective action required and details of these non-conformances or incidents which have been closed out.

A document handling system must be established to ensure accurate updating of EMP documents, and availability of all documents required for the effective functioning of the EMP. The complied environmental file must be ISO14001:2015 conformant as per JW environmental file specification (Annexure B). Supplementary EMP documentation could include:

- Method Statements.
- Environmental Action Plan
- Environmental File Site instructions.
- Emergency preparedness and response procedures.
- Record of environmental incidents.
- Non-conformance register
- Training records.
- Site inspection reports.
- Waste Register
- Water Usage Register
- Fauna and Flora Register
- Hazardous chemical Inventory list
- Monitoring reports.
- Auditing reports; and
- Public complaints register (single register for maintained for overall site).

Table 4: Monitoring Programme

ISSUE	FREQUENCIES OF MONITORING	RESPONSIBLE PERSON
WATER		
Prevention of water pollution	Weekly in rainy season	Contractor's Representative (CR)/ Johannesburg Water
Prevention of stagnant water on site.	Weekly in rainy season	
Proper functioning of sanitation facilities	Weekly	

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ISSUE	FREQUENCIES OF MONITORING	RESPONSIBLE PERSON
SOIL		
Surface or gully erosion on site	Weekly in rainy season	CR/JW
Soil contamination with oils	Monthly	CR/JW
If small, clean up. If large, appoint a suitable contractor for clean-up.	Immediately	CR/JW
Air		
Control domestic fires.	Weekly	CR/ JW
Heavy vehicle emission control.	Monthly	CR/JW
Dust control of access roads. Wetting when required.	Weekly inspection	CR
WASTE		
Efficiency of domestic waste collection.	Weekly	CR/JW
Prevention of burning of solid/liquid wastes on site.	Weekly	CR/JW
Proper collection and containment of liquid wastes (petroleum, oils, paints, resins & cooking oils)	Monthly	CR/JW
The recycling and/or disposal thereof.	Biweekly	CR
The collection and disposal of construction waste (concrete, wood, steel)	Monthly Biweekly	CR/JW
Collection of hazardous waste.		CR/JW
WILDLIFE		
Weed Control	On-going	CR/JW
Control of illegal hunting or snaring of game, birds, or other wild animals.	On-going	CR/JW
SOCIAL		
Inspect overall appearance of site.	Weekly	CR

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ISSUE	FREQUENCIES OF MONITORING	RESPONSIBLE PERSON
(Paint work, cleanliness & housekeeping)	Daily	CR/JW
Resolve complaints	Daily	CR/JW
Monitor behaviour of labourers		
SAFETY		
Inspect road signs, pedestrian, and vehicle behaviour	At least once a week	CR/JW

6.3 Internal Audits and Reporting

Typically, an audit analyses the results obtained from monitoring, assesses whether objectives and targets have been met and whether there are variances from the stipulated EMP and legal requirements. In addition, the audit assesses whether EMP implementation has been undertaken according to planned arrangements and that the EMP itself is being appropriately updated. The audit should confirm that identified corrective actions have been undertaken and then assess the effectiveness of such actions. The timing of audits should be included in the implementation schedule in the EMP.

The key steps in a successful audit are:

- Establish audit procedures.
- Determine the frequency of audits.
- Ensure that the auditors are competent, in that they must be able to undertake the audit objectively and competently. Audits may be undertaken by internal or external parties, although certain I&AP requirements may define a need for external auditors.
- Maintain records of audits.

A procedure is to be developed by the project management team for conducting EMP audits, and should incorporate processes for scheduling and reporting, as well as the timing and frequency of the audits. This procedure should also address responsibilities and required resources. The EO is usually responsible for the maintenance of the environmental audit information that is required prior, during and

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after an audit. Internal audits must be undertaken by Johannesburg Water Environmental Section on monthly basis.

6.3.1 Monthly compliance rating

A monthly compliance rating will be calculated for each Principal Contractor as per a formula determined by Johannesburg Water SOC Ltd focussing on or incorporating outcomes of assurance (e.g., monthly audit), operational assessments and other requirements, as necessary. Johannesburg Water SOC Ltd reserves the right to adjust the monthly compliance calculation formula as and when required – each revision of the monthly compliance calculation formula will be communicated to the Principal Contractor before implementation (**Each Principal Contractor is required to maintain a minimum compliance rating of 93% (Ninety-Three Percent).**)

Table 5: Compliance Rating Protocol

Classification	Scoring	Classification description
Good	93 – 100%	Substantial compliance
Average	80-92%	Compliance status needs to be improved
Poor	61-79%	Methods to ensure compliance require substantial improvement
Very poor	<60%	Methods to ensure compliance failed completely - no system in place

6.3.2 Work Stoppage

Work stoppages will be identified for 2 (two) types of work stoppages to be implemented:

- Overall work stoppage – the Principal Contractor and its Contractors are not allowed to continue with any type of construction / site work up until the work stoppage has been closed-out.
- Activity work stoppage – The Principal Contractor and its Contractors are not allowed to continue with the specific activity / task / job up until the work stoppage has been closed-out (**Overall work stoppages will be issued where non-conformances are identified against the criteria in Annexure C).**

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6.4 Environmental Awareness Plan

OBJECTIVE: Ensure all operation personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm (Environmental Awareness Plan).

To achieve effective environmental management, it is important that Contractors and site employees are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMP. Johannesburg Water is responsible for informing its employees and contractors (transportation contractor) of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. Johannesburg Water's obligations in this regard include the following:

- Employees must have a basic understanding of the key environmental features of the depot and its surrounding environment.
- Ensuring that a copy of the EMP is readily available on-site and that all site staff is aware of the location and has access to the document.
- Employees must be familiar with the requirements of the EMP and the environmental specifications as they apply to the operation of the facility.
- Ensuring that, prior to commencing any new site works, all employees have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- Awareness of any other environmental matters, which are deemed to be necessary by the depot manager.
- Ensure that construction workers have received basic training in environmental management, including the storage and handling of hazardous substances, minimise of disturbance to sensitive areas (wetland), management of waste and prevention of water pollution
- Records must be kept of those that have completed the relevant training.
- Training should be done either in a written or verbal format but must be in an appropriate format and language for the receiving audience

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- Refresher sessions must be held to ensure the operating staffs are aware of their environmental obligations.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr. This training and awareness will be achieved in the following ways:

6.4.1 Environmental Awareness and Training

Environmental Awareness and Training must be undertaken by the Environmental Officer or SHE/ELO and must take the form of an on-site talk and demonstration by the Environmental Officer before the commencement of construction activities on site. A record of attendance of this training must be maintained by the Environmental Liaison Officer/SHE Officer on site.

6.4.2 Formal Environmental Training

NB: JW must ensure that there is a budget allocated for environmental formal training in CAPEX projects for the skills development of contractor staff, development of community where project is being undertaken. The principal Contractor shall identify short courses and include them on the training matrix that can be done on site during project duration. The following are some of the trainings that can be done on site:

- ISO14001:2015 Environmental Management System Awareness
- Handling of beehives
- Snake awareness and handling
- Environmental legal Liability.
- Waste Management
- Environmental Site Representative
- Recycling
- Grass cutting training

The principal Contractor must ensure that they are appointing a registered company that meet all the requirements and before appointment of service provider, the files shall be submitted to Environmental Section for evaluation.

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6.4.3 Induction Training

Environmental induction training must be presented to all persons who are to work on the site, be it for short or long durations. Contractors or Engineers staff, site staff, sub-contractors, or visitors to site. This induction training should include discussing Johannesburg Water's environmental policy and values, the function of the EMP and the importance and reasons for compliance to these. The induction training must highlight overall dos and don'ts on site and clarify the repercussions of not complying with these. The reporting procedure must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the SHE officer on site.

6.4.4 Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least once a month) where the foreman/site supervision manager, environmental and safety representative and all employees on site hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

6.5 Erosion Management Plan

The objective to control soil erosion from an ecological perspective is:

- To reduce the effects of raindrop splash erosion on exposed soil surfaces.
- To keep rainwater on the soil surface for as long as possible to increase the infiltration rate and reduce surface runoff.
- To reduce the speed of surface runoff to reduce the erosion effect of the soil surface.
- To provide methods to retain soil, debris, seed banks and organic matter being carried away by runoff.
- To improve water retention of the area (Coetzee, 2005).

a) Areas with a high soil erosion potential on the site

Areas identified as being of high soil erosion potential on the site include:

- Any areas without vegetation cover

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- Excavated areas
- Steep areas
- Areas which undergo overland flow of water.
- Areas close to water
- Irrigated areas
- Compacted areas
- Rivers
- Drainage lines
- Any areas where developments cause water flow to accelerate on a soil surface.

If any erosion features are present as a result of the activities mentioned above the ELO must:

Assess the situation.

- Take photographs of the soil degradation.
- Determine the cause of the soil erosion.
- Inform and show the relevant contractors the soil degradation.
- Inform the contractor that rehabilitation must take place and that the contractor is to implement a rehabilitation method statement and management plan.
- Monitor that the contractor is taking action to stop the erosion and assist them where needed.
- The progress of the rehabilitation must be monitored weekly and recorded in the site diary.
- All actions with regards to the incidents must be reported on in the monthly Audit report.
- If the erosion incident has not been addressed by the contractor within 14 days of you reporting it, the Johannesburg Water 's Environmental Section must be informed.

The contractor/ developer (with the EO's consultation) must:

- Select a system to treat the erosion
- Design the treatment system
- Implement the system
- Monitor the area to see if the system functions like it should, if it the system fails adapt or adjust the system to ensure erosion is controlled.

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- Monitoring must continue until the area has been stabilized

b) General Erosion

The civil works contractor may use the following instruments to combat erosion when necessary:

- Reno matrices
- Slope attenuation
- Shade catches nets
- Mulching
- Hydro-seeding or transplanting
- Re-vegetating
- Tilling (roughing the surface)

c) Erosion Management control measures

- Areas susceptible to erosion must be protected by appropriate measures and repair of any damage caused by erosion due to construction activities must be undertaken as soon as possible.
- Minimise erosion and sedimentation into water courses through effective stabilisation (gabions and reno-mattresses) and re-vegetation of disturbed riverbanks (Refer to rehabilitation specifications and erosion control measures below).
- Stabilisation of sandy, dispersive slopes or slopes steeper than 1:3 will be required. Ensure that bare soil is covered, and hydro seeded to reduce topsoil loss.
- Ensure that all soil surfaces are protected by vegetation or a covering to avoid the surface being eroded by wind or water.
- Ensure that heavy machinery don't compact areas that are not meant to be compacted as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area.

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d) Surface water control measures

- Prevent the concentration or flow of surface water or storm water down cut or fill slopes or along pipeline routes or roads and ensure measures to prevent erosion are in place prior to construction.
- Storm water and any runoff generated by hard surfaces should be discharged into retention swales or areas with rock riprap.
- These areas should be grassed with indigenous vegetation.
- These energy dissipation structures should be placed in a manner that flows are managed prior to being discharged back into the natural water courses, thus not only preventing erosion, but also supporting the maintenance of natural base flows within these systems, i.e., hydrological regime (water quantity and quality) is maintained.
- Mitigate against siltation and sedimentation using the above-mentioned structures and ensure that all structures do not cause erosion.
- Ensure that all storm water control features have soft engineered areas that attenuate flows, allowing for water to percolate into the local aquifers.
- Minimise and restrict site clearing to areas required for construction purposes only and restrict disturbance to adjacent undisturbed natural vegetation.
- Vegetation clearing should occur in parallel with the construction progress to minimize erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment.
- Minimise the diversion of flows into different catchments.
- If implementing dust control measures, prevent over-wetting, saturation and run-off that may cause erosion and sedimentation.
- Water course (stream) crossings should not trap any run-off, thereby creating inundated areas, but allow for free-flowing water courses.

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e) Environmental Incident/Accident

All environmental related incidents should be reported to environmental section. The ELO should compile and keep an Incidents and Accidents Register on the file/book in which all environmental related incidents and accidents are recorded, e.g., chemical spills, fires, accidents involving workers and vehicles, etc.

The following information must be recorded in the Incidents Register:

- The name and contact details of the persons involved
- The person recording the incident
- The date and time of incident
- The nature, extent, and cause of the accident
- The name and contact details of any persons notified of the incident
- The actions taken to deal with the incident and whether the accident has been sufficiently
- Dealt with additional steps required to prevent recurrence of the incident.

7. RECORD KEEPING, COMPLIANCE AND PENALTIES

Various records will be kept on site for monitoring purposes these include but not limited to:

- Copy of Environmental Management Plan
- Approved Environmental Method Statements
- Environmental Authorisation
- Environmental induction attendance register
- Hazardous chemicals register
- Waste disposals register and disposal certificates
- Oil/fuel spill register

Records of non-compliance shall also be kept on record and will include the nature and magnitude of the non-compliance in a register, the action taken to discontinue the non-compliance, the action taken to mitigate its effects and the results of the actions. External complaints received regarding activities on the construction site pertaining to the environment shall be recorded in public complaints register and

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the response noted with the date and action taken. This record shall be submitted with the monthly reports and a verbal report given at the monthly site meetings. A score of 90% is required for the Monthly Audit undertaken by the Johannesburg Water 's Environmental Officers.

8. DECOMMISSIONING

Objective

- To avoid and or minimise the potential environmental and social impacts associated with the decommissioning phase

Mitigation Measures

Mitigation measures as detailed in the construction phase on the EMP regarding impacts on flora, fauna, habitats, and wetlands would be applicable to this phase.

- Rehabilitation to be undertaken in terms of specifications outlined in the Rehabilitation section of this EMP as well as in terms of any specific requirements applicable at the time.
- Johannesburg Water EO will need to supervise and monitor all decommissioning activities as per the snag list.
- All disturbed areas should be rehabilitated closer to its original state and more.

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Retainable Annexure A (Ref: Annexure 5 of JW 6.4): Acknowledgement of EMP specification by the Contractor.

Environmental Requirement for Contractors and Suppliers working for Johannesburg Capital Expenditure (CAPEX) projects	Unique no	JWEMP:122017
	Revision no	00

I, the undersigned, hereby acknowledge that I have obtained copies of the following listed documentation and confirm that I fully understand the contents thereof and the consequences of non-compliance. The Contractor furthermore reiterates its commitment to compliance of the requirements contained within the following provided documentation:

Name of the Contractor	
Vendor Number	
Project Number	
Scope of Work	
Declaration by Capital Expenditure Projects Contractor	
- I undertake to adhere to the requirements as set out in: - Johannesburg Water Environmental Management Plan and Waste Management Plan - Environmental requirements for Contractors working on Capital Expenditure Projects - I undertake to comply with all applicable environmental legal and other requirements. - Undertake to comply with Johannesburg Water 's environmental standards, policies, and procedures where applicable. - I pledge to inform all staff of their role in managing environmental impacts on site. - I am fully aware that incidents must be reported within 24 hours of occurrence. - I pledge to always implement environmental best practice on site during the contract. - I pledge that all non-conformances issued to us will be addressed promptly.	

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I hereby acknowledge that I have obtained copies of Johannesburg Water Environmental Management Plan and Waste Management Plan and confirm that I fully understand the contents thereof and the consequences of non-compliance. The Contractor furthermore reiterates their commitments to compliance of the requirements contained within the following provided documentations and conform to all above mentioned requirements.

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

Contractor Representative Name:	Signature:	Date:
Designation:		
JW Project Engineer/Manger (Witness) Name:	Signature:	Date:

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Annexure B: Contractors Environmental File Evaluation Form

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		A minimum score of 80% is required on all sections for the approval of the submitted Environmental file System. Failure to achieve the required score will result in non-approval of the Environmental file, and the project will not commence prior file approval.	
ENVIRONMENTAL SYSTEM EVALUATION OUTCOME			
AVERAGE SCORE OBTAINED			0.00%
		APPROVED/REJECTED	
EVALUATED BY:	REVIEWED BY:	APPROVED/REJECTED BY:	ACKNOWLEDGED BY:
DESIGNATION:	DESIGNATION:	DESIGNATION:	DESIGNATION:
SIGNATURE:	SIGNATURE:	SIGNATURE:	SIGNATURE:
DATE:	DATE:	DATE:	DATE:
PROJECT DETAILS			
Contract Number			
Project Title			
Name of Contractor			
Is the project screened?	YES/NO	IF NO	Construction activities/work (including site establishment) should ONLY commence when after the project is Screened

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Specialist Studies/Report		
Environmental Authorisation (If applicable)		
Water Use Licence /General Authorisation (If applicable)		
SCORE ANALYSIS		
	Satisfactory (Approved)	Requirements have been met
0.00%	Unsatisfactory (Not Approved)	Requires substantial improvement / partially achieved
ENVIRONMENTAL REQUIRED DOCUMENTS		
1	Copy EMP and signed acknowledgement letter for JW EMP	0
2	SHE/ELO appointment letter	0
3	Contractor Environmental Induction presentation	0
3	Environmental Toolbox talk and copy of attendance register template	0
5	Environmental Objective (Site specific)	0
6	Environmental Policy Statement	0
7	Registers	0
3	Legal Register (Site specific)	0
9	Environmental Aspect and Impact register (site specific)	0
10	Permit register	0
11	Non-Conformance Register	0
12	Waste register template	0
13	Complaint register	0
14	Incident register	0

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15	Method statement register	0
16	Hazardous substances register	0
17	Daily Environmental checklist/ weekly checklist and spill kit checklist	0
18	Spill kit checklist	0
19	Method statements or procedures	0
20	Document control procedure	0
21	Storm water management plan/ Erosion control	0
22	Alien invasive and weeds control plan	0
23	Hazardous Management Plan/ Procedure (i.e., handling of hazardous substances)	0
24	Method statement for the activities to be undertake/ (include environmental aspects on the technical MS)	0
25	Waste management plan/ Method statement for waste management	0
26	Incident report template (Flash report/Investigation report)	0
3	Emergency Response Plan	0
28	Training Matrix	0
29	Dust Management Plan or Method Statement for dust suppression	0
30	Contractor Audit procedure/template	0
31	Rehabilitation Plan or Method Statement for Rehabilitation/Reinstatement	0
TOTAL		0

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Annexure C: Environmental Work instruction

ENVIRONMENTAL MANAGEMENT (EM) SITE INSTRUCTION



Document No: JW- EMS-HO—R014

1. All JW rules and regulation including JW Environmental Management Plan and other applicable legislation, standard and by-laws must be adhered to at all times.
2. Copies of Environmental Authorisation, Water Use License/General Authorization, Rehabilitation plan, EMP shall be kept on site **(where applicable)**.
3. All JW sites must have waste bins, drip trays, spill kit and designated hazardous storage **(where applicable)**.
4. Only registered Waste Service providers who comply with National Environmental Management Waste Act and Municipal By-laws shall be appointed.
5. No burning or burying of waste is allowed on site.
6. The conservation of water and the use of energy efficiently shall be implemented in all JW sites.
7. The letter from City Parks for occupying the open space shall be received and kept in the file and if the land belongs to the private owner, the copy of an agreement letter shall be kept in the file **(where applicable)**.
8. The photos are taken before and during and after the project **(where applicable)**.
9. The Environmental file must be approved before the commencement of works on site **(where applicable)**.
10. The Environmental file will be kept on site all the times and shall be made available to competent authority and JW environmental representative **(where applicable)**.
11. Rehabilitation/ reinstatement of the site must be done as per the JW EMP, rehabilitation method statement.
12. The hazardous waste must only be stored not more than 90 days on site as per the legislation.
13. Only asbestos registered service providers shall be appointed to handle and dispose asbestos to registered landfill site.
14. No mixing of general and hazardous waste will be allowed.
15. No cutting of trees is allowed on site without permit.
16. If archaeological artefacts or anything of heritage importance are found at JW sites/ servitude Environmental Section must be informed.
17. Everyone working within JW sites shall familiarize with the EMP requirements and other applicable JW environmental procedures.
18. All the environmental incidents shall be reported within 24 hours to JW environmental Section.

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19. Ensure that all JW employees and its service providers or suppliers receive environmental induction.
20. All work must be carried out under close supervision by the competent persons.
21. Repetitive findings or non-compliances shall be avoided.
22. Topsoil stockpile shall be protected by erosions control berms if it is exposed to a period of 14 days during wet season (where applicable).
23. Only 150mm of topsoil shall be removed and stockpile at a height of not more than 1m.
24. All hazardous material must be stored on a bunded and ventilated storage, and MSDS must be available for all of them.
25. No painting or marking of natural features is allowed on site.
26. Pollution of the environment shall be prevented all the times.
27. No leaking mobile plant is allowed on site.
28. Dust control measures shall be implemented on site (where applicable).
29. No sewer spillage shall spill into the storm water or the watercourse.
30. All environmental related incidents and/or emergencies shall be investigated within 48 hours from the date of notice.
31. Killing of fauna and/or Avifauna is prohibited.
32. Alien invasive and weeds must be eradicated.
33. Fumigation shall be done by trained personnel that is registered with DAFF.
34. No smoking is allowed in restricted areas. All such areas are posted appropriately.
35. Personal protective equipment is required to be worn at all times in production areas.
36. Maintain good housekeeping in your work area.
37. Keep fire lanes, roadways, walkways, and aisles free and clear of material.
38. The use of unsafe or defective equipment or tools is not permitted.
39. A contractor or subcontractor shall leave no unused materials on site. At the completion of a project the contractor shall remove all unused material and all waste shall be properly disposed of at a registered landfill site.
40. Any contractor or subcontractor found to be in violation of any EH&S rules can be ejected or escorted off premises if deemed necessary.
41. This file shall be kept on site and will be available at all times to the JW Reps and authorities (upon request).

ACKNOWLEDGEMENT BY MANAGER/CONTRACTOR

I, _____ the Manager/Contractor, do hereby declare that my site/company

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_____ acknowledges having read and understood the conditions contained in this document and furthermore, the employees agree to abide by these conditions.

CONTRACTOR/FACILITY	REP.	SIGNATURE	DATE
ENVIRONMENTAL SITE INSTRUCTION		Document No: JW- EMS-HO— R014	  a world class African city
Name of Contractor/Facility			
Responsible Manager/ Engineer			
Project No. (where applicable):		Date Issued:	Date of Inspection:
Environmental Representative:		Designation:	
<i>Should the responsible persons fail to comply with any term of this instruction, JW may demand compliance in writing from the defaulting party. Should the defaulting party fail to comply within the stipulated time frames, JW shall take the necessary steps to remedy the situation.</i>		PROJECT DESCRIPTION	
Reference No. of Non-Conformances		Action Required	
EM-1.			
EM-2.			

DISCLAIMER

- Should there be any other Environmental related activities issued as non-compliance during construction, the contractor is liable to comply with those requirements
- Should the contractor deviate from the conditions and requirements of the EMP and/or Environmental Authorisation (if applicable), the contractor is liable for non-compliances, rectification and associated fines thereof
- This EMP does not exempt the Contractor from complying with other relevant legislations related to the construction activities.

ENVIRONMENTAL MANAGEMENT PLAN

EM-3.		
EM-4.		
EM-5.		
EM-6.		
EM-7.		
EM-8.		
EM-9.		
EM-10.		
Received & Acknowledged by	Signature	Date
Responsible Manager/Contractor		
Responsible Consultant (<i>where applicable</i>)		
JW Environmental Representative		
JW Project Inspector / Engineer (<i>where applicable</i>)		
Contractor SHE/EL Officer (<i>where applicable</i>)		
COMMENTS BY RESPONSIBLE MANAGER/ENGINEER:	Target date for corrections	
	Accepted/Acknowledged by Manager/Contractor	

DISCLAIMER

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ENVIRONMENTAL MANAGEMENT PLAN

COMMENTS BY CONTRACTOR (<i>WHERE APPLICABLE</i>):	Follow up comments by JW Environmental Representative

ENVIRONMENTAL MANAGEMENT PLAN – JOHANNESBURG WATER SOC LTD	Page Number
VOLUME 2.5 –JANUARY 2022 REVISION 04	Page 104 of 105

DISCLAIMER

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ENVIRONMENTAL MANAGEMENT PLAN

Annexure D: Johannesburg Water General Surface Rehabilitation Specification

Johannesburg Water General Surface Rehabilitation Specification

Doc No: JW-EMS-CAPEX-T040
Effective Date:14/9/2021

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
1	Rehabilitation Plan	m2	0	10.05	1	1	0
2	Rehabilitation of disturbed area/s including roads (prepare the ground/level profiling,soil surfaces including	m2	0	22.05	1	1	0
2	Replacement/import of topsoil (if required)	m2	0	22.05	1	1	0
3	Planting of grass/hydroseeding (Including hydro seeding seed mix ratio).	m2	0	22.05	1	1	0
4	Maintainance for 3 month (weed removal, replanting, soil conditioner, erosion repairs ect.)	m2	0	17.4	1	1	0
5	Rehabilitation close-out report	m2	0	10.05	1	1	0
6	Bioremediation (process to be determined if required)	m2	0	22.05	1	1	0
					Sub Total 1		0

1	Preliminary and General	0	weighting factor 2		0
			1		
2	Contingencies	0			0
			Subtotal 2		0.00
			VAT (15%)		0.00
			Grand Total		0

ENVIRONMENTAL MANAGEMENT PLAN – JOHANNESBURG WATER SOC LTD	Page Number
VOLUME 2.5 –JANUARY 2022 REVISION 04	Page 105 of 105

DISCLAIMER

- Should there be any other Environmental related activities issued as non-compliance during construction, the contractor is liable to comply with those requirements
- Should the contractor deviate from the conditions and requirements of the EMP and/or Environmental Authorisation (if applicable), the contractor is liable for non-compliances, rectification and associated fines thereof
- This EMP does not exempt the Contractor from complying with other relevant legislations related to the construction activities.



Johannesburg Water SOC Ltd



LINBRO WATER UPGRADE

VOLUME 4

TENDER DRAWINGS

Employer:		Contractor:	
Witness:		Witness:	

LIST OF DRAWINGS

DWG NO:

DESCRIPTION

WATER:

JW14301R-DET01-W01	LIST OF DRAWINGS
JW14301R-DET02-W01	LOCALITY PLAN
JW14301R-DET03-W01	LAYOUT PLAN
JW14301R-DET04-W01	LPARC LAYOUT PLAN
JW14301R-DET05-W01	GUARD HOUSE
JW14301R-DET06-W01	TYPICAL THRUST BLOCKS DETAILS
JW14301R-DET07-W01	ROAD CROSSING BY PIPE JACKING: SECTION 1
JW14301R-DET08-W01	STEEL PIPE TAPERS AND BENDS
JW14301R-DET09-W01	STEEL PIPE PROTECTIVE COATING,PIPE JOINTING FOR PLAIN AND BELL ENDED JOINTS AND MAKING GOOD OF JOINTS
JW14301R-DET10-W01	STANDARD DETAILS FOR TRENCH EXCAVATION AND BACKFILL FOR STEEL PIPES > 400mm ND
JW14301R-DET11-W01	AIR VALVE CHAMBER ON 1100mm ND PIPE
JW14301R-DET12-W01	AIR VALVE CHAMBER PADLOCK PIN DETAILS
JW14301R-DET13-W01	TYPICAL SCOUR VALVE CHAMBER FOR PIPES > 400mm ND
JW14301R-DET14-W01	AIR VALVE CHAMBER ON 1000mm ND PIPE
JW14301R-DET15-W01	ISOLATION VALVE CHAMBER AND INCLUDING OFF TAKE
JW14301R-DET16-W01	ISOLATION VALVE CHAMBER COVER SLAB
JW14301R-DET17-W01	PRESSURE REDUCING AND RESERVOIR CONTROL VALVE CONFIGURATION
JW14301R-DET18-W01	PRESSURE REDUCING AND FLOW METER PIPE SCHEDULE
JW14301R-DET19-W01	RESERVOIR CONTROL VALVE PIPE SCHEDULE
JW14301R-DET20-W01	RES 1 RESERVOIR INLET ARRANGEMENTS
JW14301R-DET21-W01	RES 2 RESERVOIR INLET ARRANGEMENTS
JW14301R-DET22-W01	NODE AND JUNCTION DETAILS
JW14301R-DET23-W01	PIPE MARKERS
JW14301R-DET24-W01	NAME BOARD
JW14301R-DET25-W01	LONG SECTION SECTION 1
JW14301R-DET26-W01	LONG SECTION SECTION 2 TO SECTION 4b
JW14301R-DET27-W01	STEEL STAIRCASE LAYOUT
JW14301R-DET28-W01	NAME BOARD HOLDER
JW14301R-DET29-W01	CATHODIC PROTECTION - INSULATING JOINT

DWG NO:

DESCRIPTION

STRUCTURE:

JW14301R-DET30-W01	REINFORCEMENT DETAILS - TYPICAL SCOUR VALVE CHAMBER FOR PIPE >400 ND
JW14301R-DET30A-W01	REINFORCEMENT DETAILS - TYPICAL SCOUR VALVE CHAMBER FOR PIPE >400 ND - BENDING SCHEDULE
JW14301R-DET31-W01	REINFORCEMENT DETAILS - ISOLATION VALVE CHAMBER
JW14301R-DET31A-W01	REINFORCEMENT DETAILS - ISOLATION VALVE CHAMBER - BENDING SCHEDULE
JW14301R-DET32-W01	REINFORCEMENT DETAILS - PRESSURE REDUCING BUILDING
JW14301R-DET32A-W01	REINFORCEMENT DETAILS - PRESSURE REDUCING BUILDING - BENDING SCHEDULE
JW14301R-DET33-W01	REINFORCEMENT DETAILS - PRESSURE REDUCING BUILDING
JW14301R-DET33A-W01	REINFORCEMENT DETAILS - PRESSURE REDUCING BUILDING - BENDING SCHEDULE
JW14301R-DET34-W01	REINFORCEMENT DETAILS - FLOW METER CHAMBER
JW14301R-DET34A-W01	REINFORCEMENT DETAILS - FLOW METER CHAMBER - BENDING SCHEDULE
JW14301R-DET35-W01	REINFORCEMENT DETAILS - RESERVOIR CONTROL VALVE BUILDING
JW14301R-DET35A-W01	REINFORCEMENT DETAILS - RESERVOIR CONTROL VALVE BUILDING - BENDING SCHEDULE
JW14301R-DET36-W01	REINFORCEMENT DETAILS - RESERVOIR CONTROL VALVE BUILDING
JW14301R-DET36A-W01	REINFORCEMENT DETAILS - RESERVOIR CONTROL VALVE BUILDING - BENDING SCHEDULE

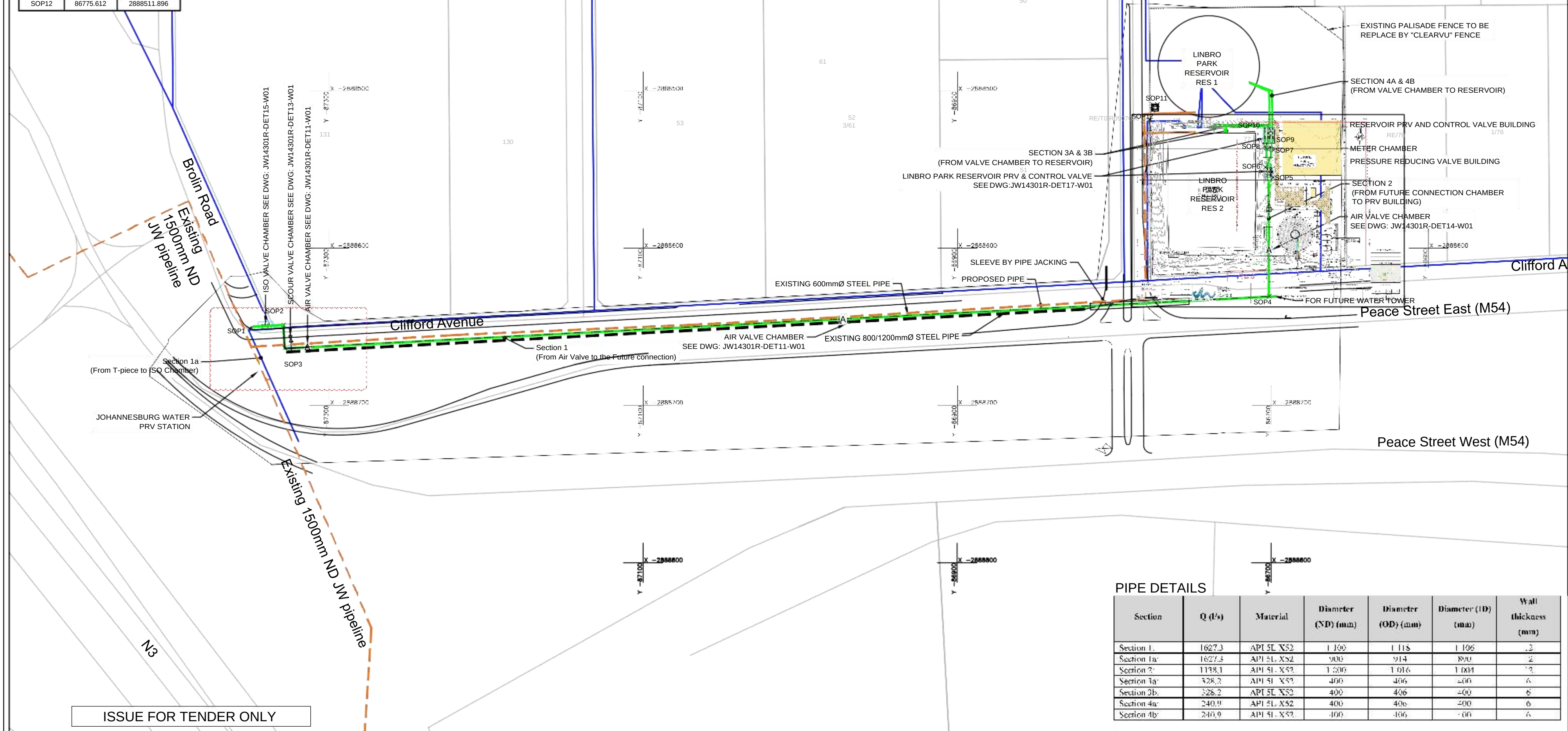
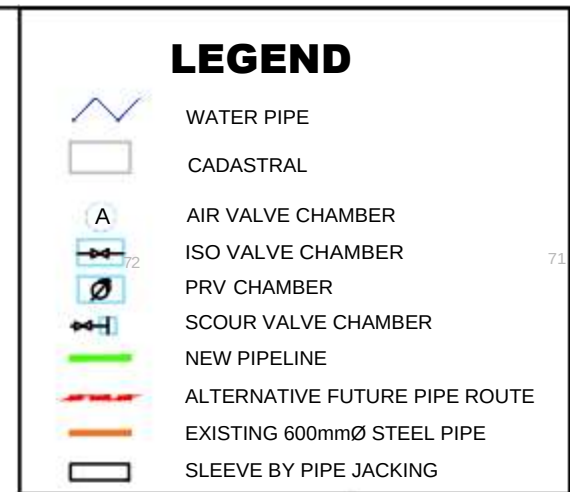
NOTE:

THESE DRAWINGS ARE ISSUED FOR TENDER ONLY.

ISSUE FOR TENDER ONLY

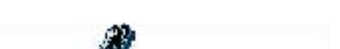
 MARISWE Engineering & Construction MARISWE (Pty) Ltd P.O.Box 25549 Monument Park 0105 TEL: +27 (0) 12 424 9700	DESIGNED	W.K	19/05/2014	 Johannesburg Water	TURBINE HALL 65 NTEMI PILISO STREET NEWTOWN 2113 TEL: (011) 688-1542 FAX: (011) 688-6604	JW14301R: LINBRO WATER UPGRADES LIST OF DRAWINGS	SCALE	REV:	AMENDMENTS	APPROVED DATE:	DRAWING No: JW14301R-DET01-W01 JW14301R DET01 T PROJECT No. DRAWING No. REV. A1 SHEET 1 OF 1 ORIGINAL PAGE SIZE FILE No:
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	APPROVED BY: K.GOVENDER		09/07/2024								
	ECSA REG. No.	201470227									
	CHECKED										
	APPROVED BY: E.MUDAU										
	ECSA REG. No.										

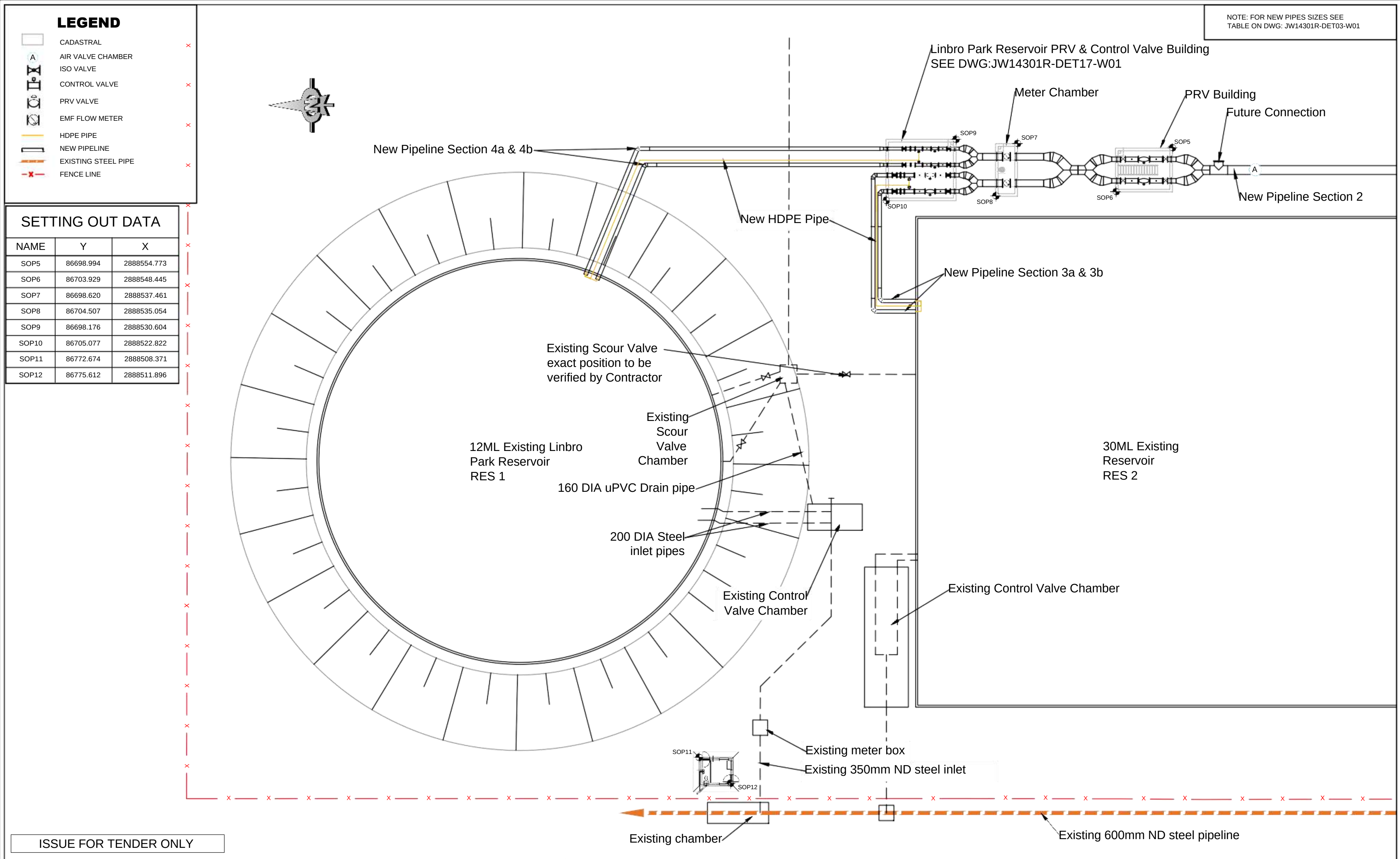
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SOP5	86698.994	2888554.773
SOP6	86703.929	2888548.445
SOP7	86698.620	2888537.461
SOP8	86704.507	2888535.054
SOP9	86698.176	2888530.604
SOP10	86705.077	2888522.822
SOP11	86772.674	2888508.371
SOP12	86775.612	2888511.896



PIPE DETAILS						
Section	Q (l/s)	Material	Diameter (ND) (mm)	Diameter (OD) (mm)	Diameter (ID) (mm)	Wall thickness (mm)
Section 1c	1627.3	API 5L X52	1190	1118	1196	2
Section 1a	1627.3	API 5L X52	900	914	890	2
Section 2c	1138.1	API 5L X52	1200	1016	1004	2
Section 1a	328.3	API 5L X52	400	406	400	6
Section 3b	328.2	API 5L X52	400	406	400	6
Section 4a	240.9	API 5L X52	400	406	400	6
Section 4b	240.9	API 5L X52	400	406	400	6

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 MARISWE PRIDE IN LIFE FOR A BETTER SOLUTION MARISWE (Pty) Ltd P.O.Box 25549 Monument Park 0105 TEL: +27 (0) 12 424 9700	DESIGNED	L.D.J	06/06/2016	 Johannesburg Water	TURBINE HALL 65 NTEMI PILISO STREET NEWTOWN 2113 TEL: (011) 688-1542 FAX: (011) 688-6604	 JW14301R: LINBRO WATER UPGRADES LAYOUT PLAN	SCALE	REV:	AMENDMENTS	APPROVED DATE:	DRAWING-No. JW14301R-DET03-W01 JW14301R PROJECT No. DET03 DRAWING No. 0 REV. A1 SHEET 1 OF 1 FILE No.
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	APPROVED BY:		09/07/2024								
		SIGNATURE	DATE								
	ECSA REG. No.	201470227									
	CHECKED										
	APPROVED BY:										
		SIGNATURE	DATE								
	ECSA REG. No.										



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MARISWE (Pty)Ltd
P.O.Box 25549
Monument Park
0105
TEL: +27 (0) 12 424 9700
FAX: +27 (0) 12 460 4071

DESIGNED	L de J	19.05.2014
DRAWN	C.K	19.05.2014
CHECKED	K.G	14/02/2019
APPROVED BY:		09/07/2024
ECSA REG. No.	201470227	
CHECKED		
APPROVED BY:	E. MUDAU	
ECSA REG. No.		

TURBINE HALL
65 NTEMI PILISO STREET
NEWTOWN
2113
TEL: (011) 688-1542
FAX: (011) 688-6604

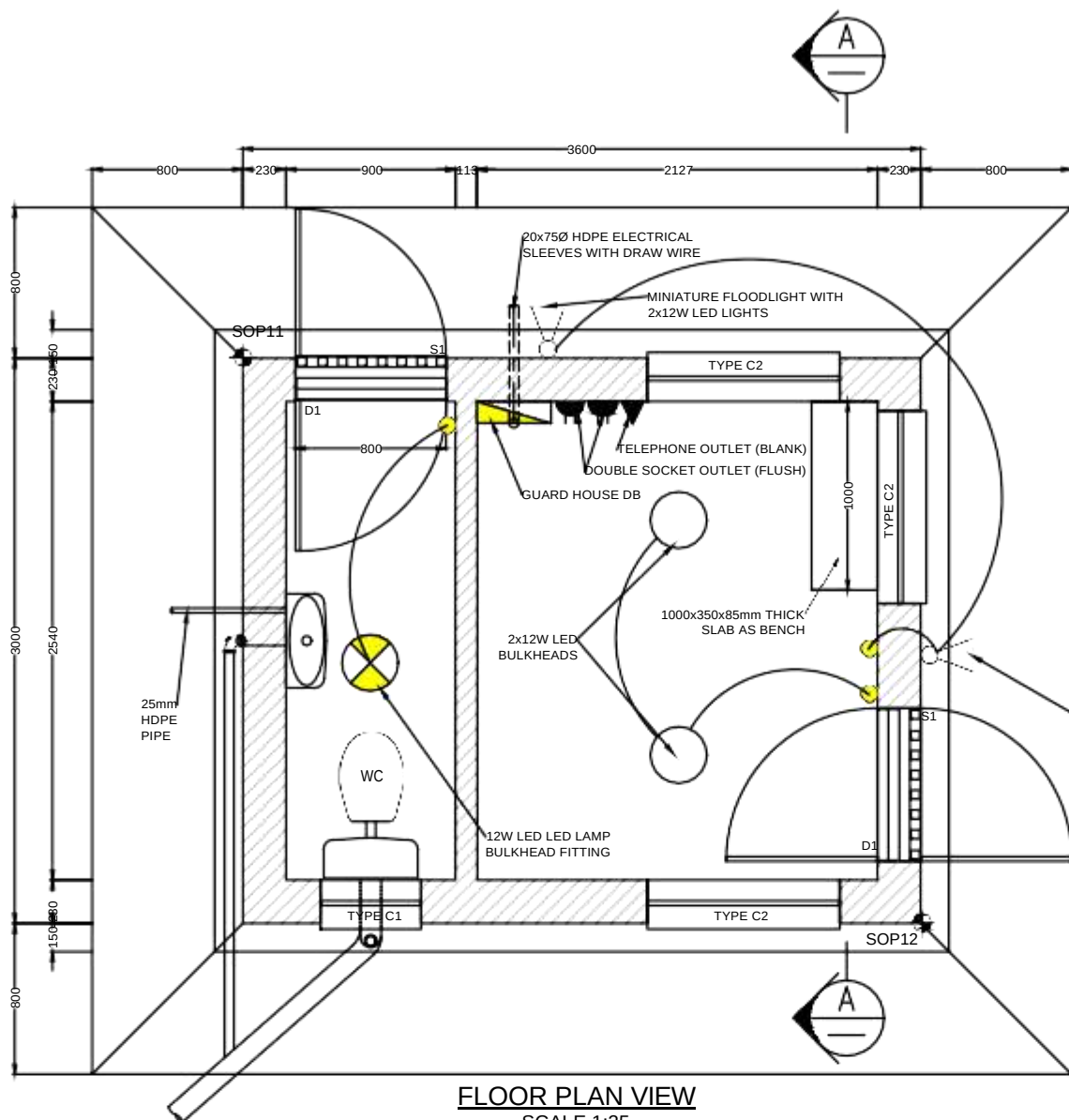
JW14301R: LINBRO WATER UPGRADES
LPARC LAYOUT PLAN

SCALE	REV:	AMENDMENTS	APPROVED DATE:
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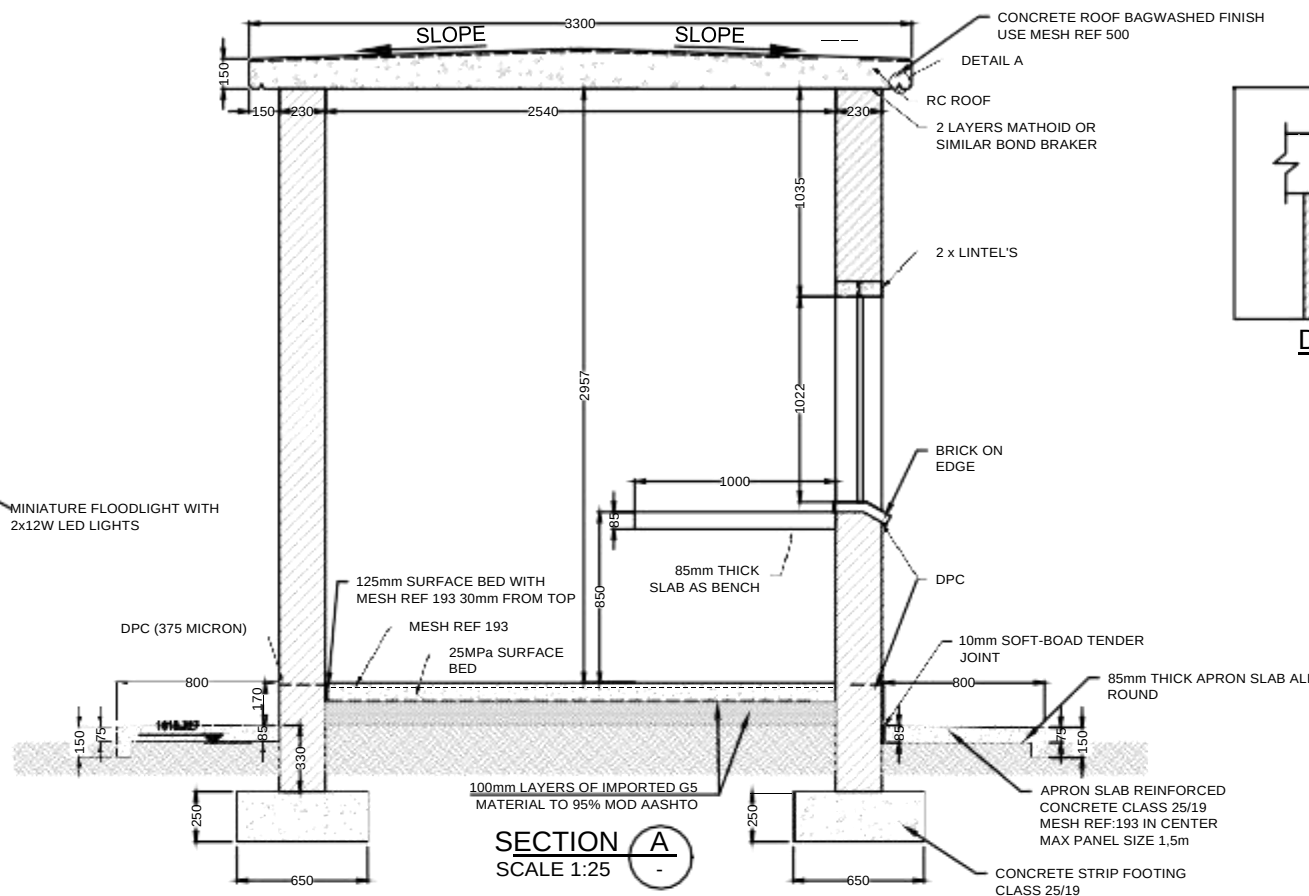
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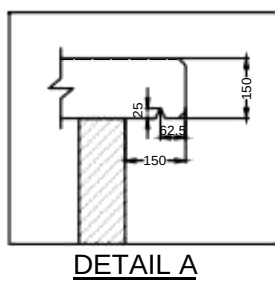
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ORIGINAL PAGE SIZE		
FILE No.		



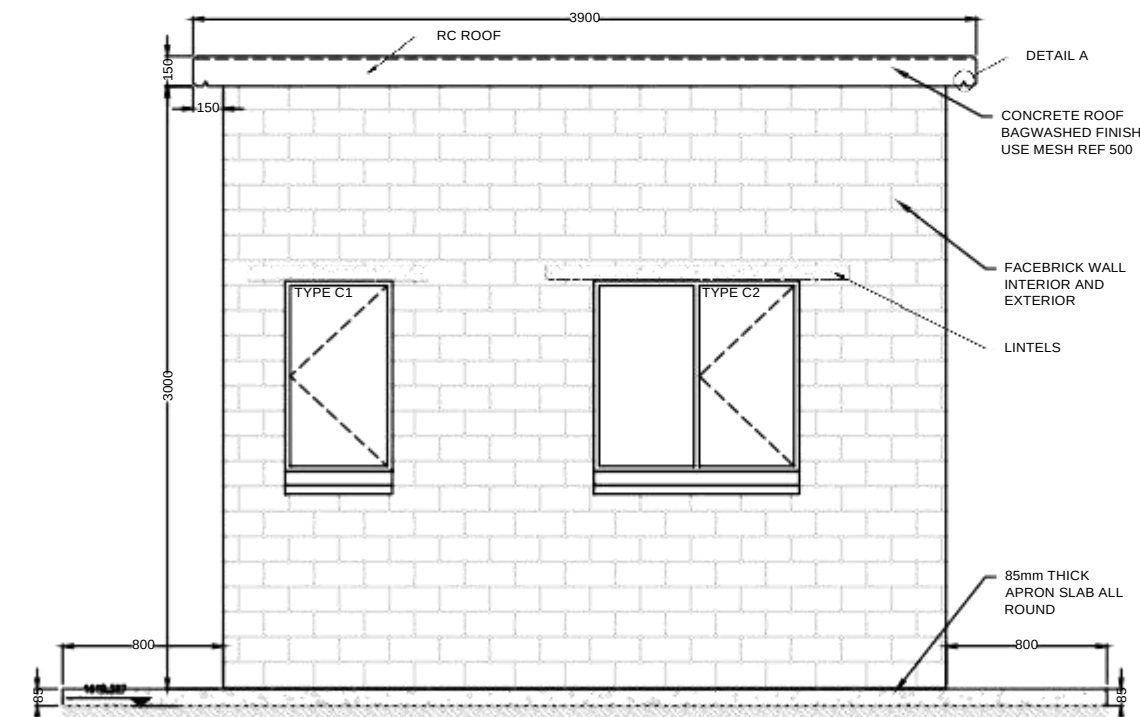
FLOOR PLAN VIEW
SCALE 1:25



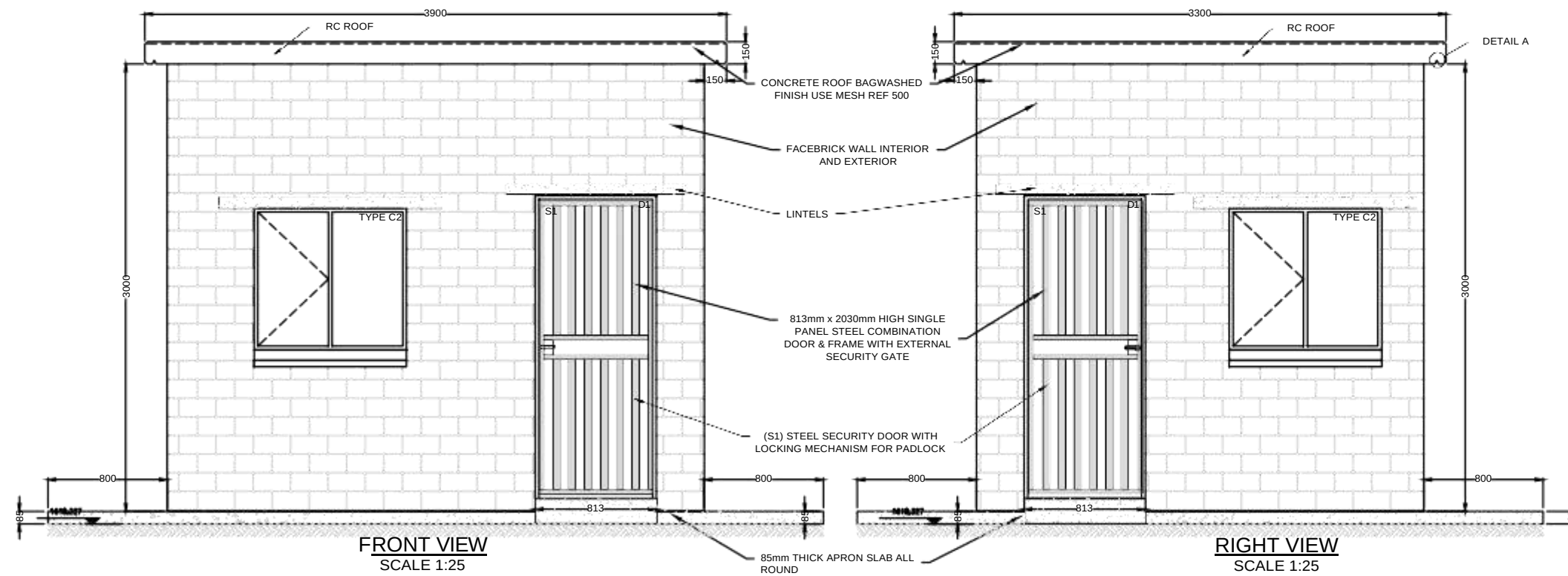
SECTION A
SCALE 1:25



DETAIL A



BACK VIEW
SCALE 1:25



FRONT VIEW
SCALE 1:25

RIGHT VIEW
SCALE 1:25

SETTING OUT DATA		
NAME	Y	X
SOP11	86772.674	2888508.371
SOP12	86775.612	2888511.896

NOTES:

SPECIFIC NOTES

1. FIXING BOLTS FOR WASHTROUGH SHOULD NOT BE MORE THAN 30mm FROM CORNER OF METAL FRAME.
2. THE 50mm HOLDERBAT SHOULD NOT BE MORE THAN 50mm BELOW THE VENT VALE.
3. FIT THE WASTE WATER PIPE FROM THE WASHTROUGH TO THE SOIL PIPE. A 50x50mm PVC-U 95° JUNCTION SHOULD BE USED. CARE SHOULD BE TAKEN NOT TO INSTALL THE JUNCTION UPSIDE DOWN.
4. THE 110mmØ PIPE FROM THE TOILET PAN TO THE 110mmØ VENTHORN BEND AND THE VERTICAL 110mmØ PIPE DOWN TO THE ¼ BEND BELOW GROUND SHOULD BE OF 110mmØ SOIL VENT WASTE (SVW) PIPE.
5. "THE WHITE PIPE" DAMP COURSE TO BE PLACED AT THE BOTTOM OF THE WALL.
6. BRICKFORCE SHOULD BE PLACED BETWEEN THE BOTTOM THREE LAYERS AND REPEATED IN EVERY FOURTH LAYER ABOVE.
8. THE FLUSHING LEVER OF THE CISTERN SHOULD BE ON THE SAME SIDE AS THE WATER INLET TO THE CISTERN.
9. TOILET TO BE TYPICAL LOW LEVEL WC SUITE WITH MATERIAL TO BE CERAMIC-VITREOUS CHINA TO SANS 497. SINGLE FLUSH CISTERN TO HAVE 9L CAPACITY. HEAVY DUTY PLASTIC SEAT TO BE INCLUDED.
10. WASHBASIN TO BE CERMIC-VITREOUS CHINA WITH CP OVERFLOW. DIMENSIONS OF WASHBASIN TO BE DETERMINED ON SITE. SINGLE 20mm TAP TO BE BASIN-MOUNTED AND OF TRADITIONAL PILLAR-TYPE.

GENERAL NOTES

1. ALL MATERIAL AND WORKMANSHIP MUST COMPLY WITH THE REQUIREMENTS OF THE LATEST RELEVANT SANS REQUIREMENTS.
2. ALL DIMENSIONS ARE IN MILLIMETERS. (UNLESS OTHERWISE SPECIFIED).
3. DO NOT SCALE FROM THIS DRAWINGS.
4. ALL DIMENSIONS MUST BE CHECKED AND APPROVED ON SITE.

- TYPE D1 : 813mm x 2030mm HIGH SINGLE PANEL STEEL COMBINATION DOOR & FRAME WITH EXTERNAL SECURITY GATE.
- TYPE C1 : 533mm x 969mm STEEL WINDOW FRAME WITH UNDERCOATED PAINT.
- TYPE C2 : 1022mm x 949mm STEEL WINDOW FRAME WITH UNDERCOATED PAINT.

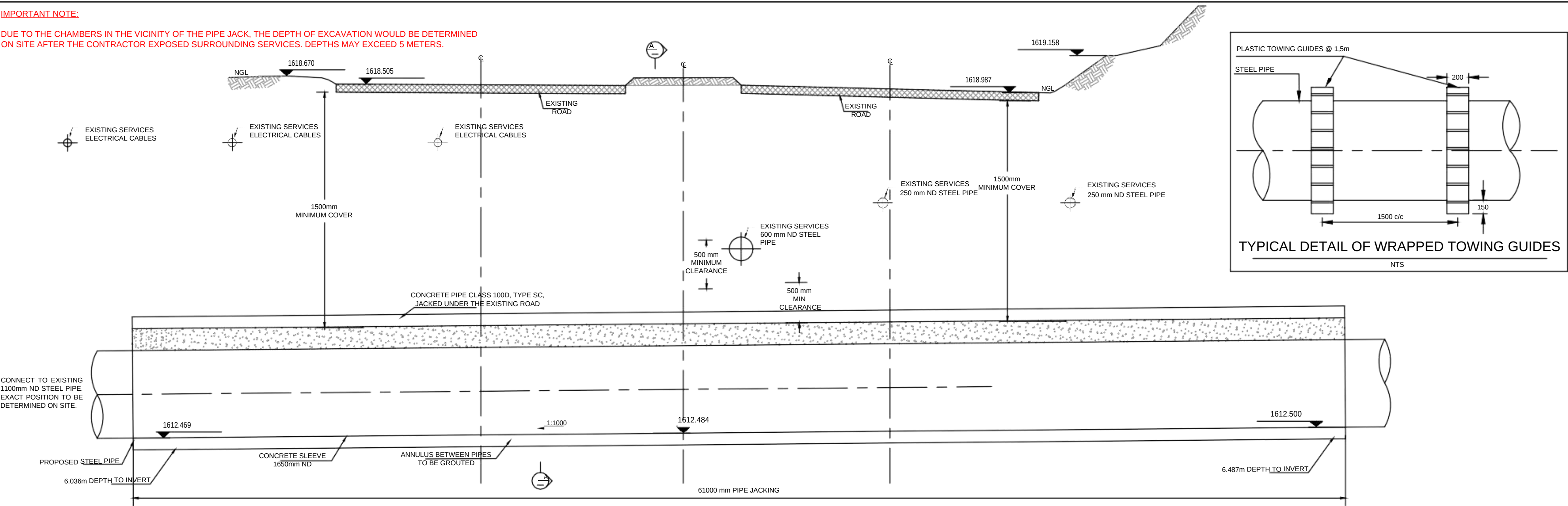
ELECTRICAL NOTES:

1. THE ELECTRICAL INSTALLATION SHALL CONFORM TO SANS 10142-1: WIRING OF PREMISES: LOW-VOLTAGE INSTALLATIONS AS WELL AS ALL APPLICABLE MUNICIPAL REGULATIONS.
2. THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL EARTHING AND BONDING OF THE BUILDING.
3. THE BUILDING SHALL BE EQUIPPED WITH A DISTRIBUTION BOARD, EQUIPPED WITH EARTH LEAKAGE PROTECTION. TO BE POSITIONED ON THE WALL IN AN UNOBSTRUCTED POSITION AND MOUNTED FLUSH.
4. ALL CABLES SHALL BEAR THE SABS MARK.
5. ALL ELECTRICAL WIRING SHALL BE INSTALLED IN CONDUIT BUILT INTO THE WALLS AND CEILING SLAB. ALL CONDUITS SHALL BEAR THE STAMP OF APPROVAL BY THE SABS.
6. THE SWITCHED SOCKET OUTLETS SHALL COMPLY WITH SANS 164. THE WIRING CIRCUIT FOR THE SWITCHED SOCKETS SHALL BE 2.5 MM SQ. PVC INSULATED STRANDED COPPER GENERAL PURPOSE WIRE WITH 2.5MM SQ. STRANDED COPPER EARTH WIRE.
7. THE BUILDING SHALL BE EQUIPPED WITH 3 X TUBULAR FLUORESCENT LAMP LUMINARIES FOR INDOOR USE, TWO IN THE MAIN OFFICE AND ONE IN THE ABLUTION SECTION. TYPE F2, SURFACE MOUNTED 1.2M X 2 LAMP (26 W) FLUORESCENT LIGHT FITTING WITH DIE FORMED GLASS FIBRE REINFORCED POLYCARBONATE ROTOLOCK LAMP HOLDERS. ALL CONTROL GEAR WITHIN THE LUMINARIES SHALL BEAR THE STAMP OF APPROVAL BY THE SABS. INSULATION CLASS IP55 (DUST AND VAPOUR PROOF).
8. EACH LUMINARIES SHALL HAVE A DEDICATED WALL MOUNTED LIGHT SWITCH, CONFORMING TO SANS 1663.
9. THE WIRING CIRCUIT FOR THE LUMINARIES SHALL BE 1.5 MM SQ. PVC INSULATED STRANDED COPPER GENERAL PURPOSE WIRE WITH 1.5MM SQ. STRANDED COPPER EARTH WIRE.
10. COMPLIANCE: THE CONTRACTOR SHALL TEST THE ENTIRE INSTALLATION IN TERMS OF THE ELECTRICAL INSTALLATION REGULATIONS 2009 OF THE OCCUPATIONAL HEALTH AND SAFETY ACT 1993, AND SHALL ISSUE A CERTIFICATE OF COMPLIANCE ON THE OFFICIAL FORM. ALL TESTS SHALL BE CARRIED OUT IN CONJUNCTION WITH AND TO THE SATISFACTION OF THE ENGINEER'S REPRESENTATIVE.

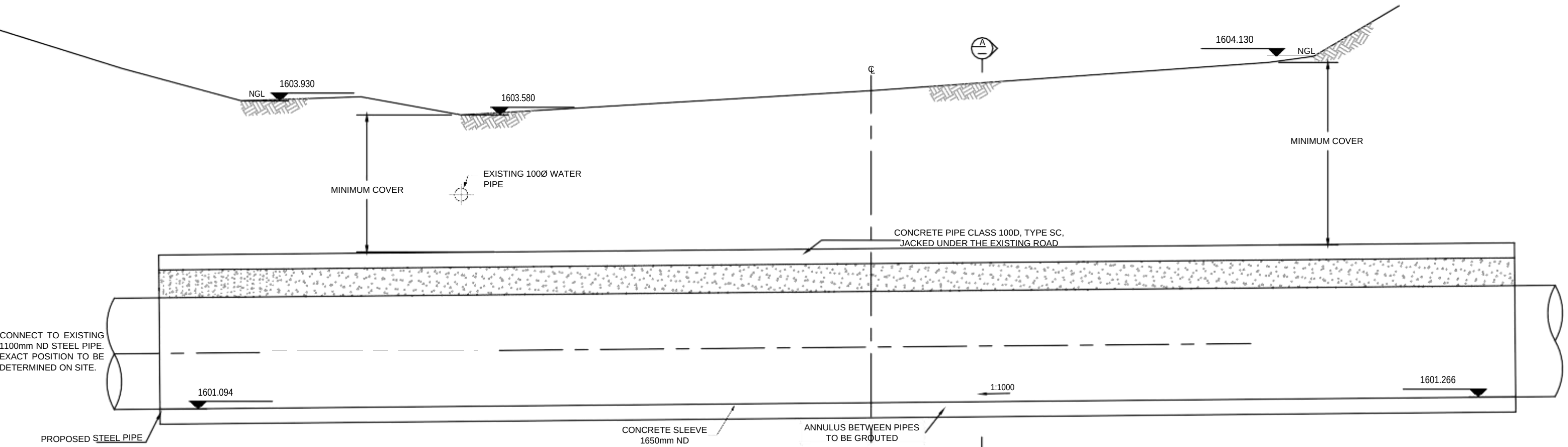
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 MARISWE (Pty) Ltd P.O.Box 25549 Monument Park 0105 TEL: +27 (0) 12 424 9700	DESIGNED	D.V	17.03.2015	 Johannesburg Water	TURBINE HALL 65 NTEMI PILISO STREET NEWTOWN 2113 TEL: (011) 688-1542 FAX: (011) 688-6604	 JW14301R: LINBRO WATER UPGRADES GUARD HOUSE	SCALE	REV:	AMENDMENTS	APPROVED DATE:	DRAWING-No. JW14301R-DET05-W01 JW14301R PROJECT No. A1 SHEET 1 OF 1 ORIGINAL PAGE SIZE FILE No.
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	CHECKED	K.G	14/02/2019								
	APPROVED BY: K.GOVENDER	SIGNATURE	09/07/2024								
	ECSA REG. No.	201470227	DATE								
	CHECKED										
	APPROVED BY: E.MUDAU	SIGNATURE	DATE								
	ECSA REG. No.										

IMPORTANT NOTE:
DUE TO THE CHAMBERS IN THE VICINITY OF THE PIPE JACK, THE DEPTH OF EXCAVATION WOULD BE DETERMINED ON SITE AFTER THE CONTRACTOR EXPOSED SURROUNDING SERVICES. DEPTHS MAY EXCEED 5 METERS.



TYPICAL ROAD CROSSING BY PIPE JACKING SECTION 1 CH: 550.994 TO CH 613.058
NTS

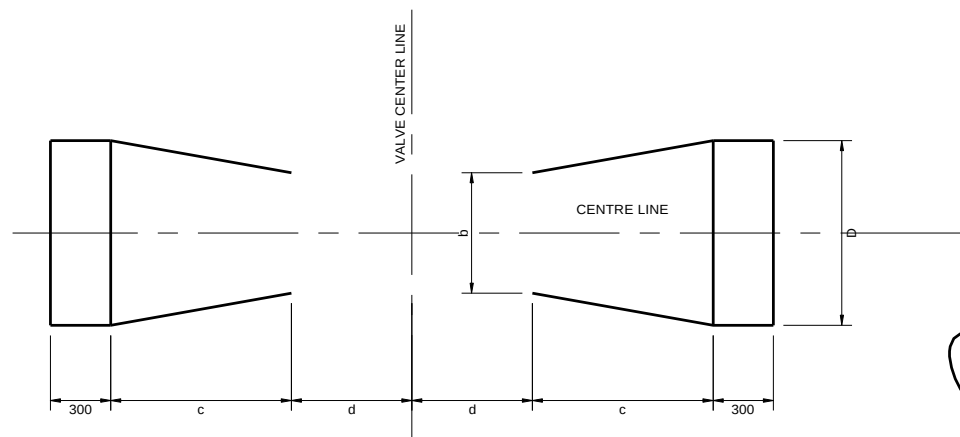


TYPICAL ROAD CROSSING BY PIPE JACKING SECTION 1 CH: 023.341 TO CH 035.541
NTS

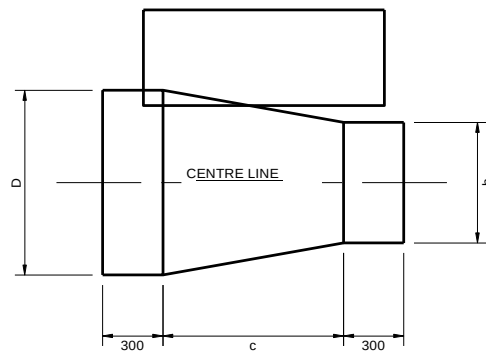
- NOTES:
- 1) JACKED SLEEVES SHALL BE CONCRETE PIPES CLASS 100D, TYPE SC, SANS 677.
 - 2) SIZE OF SLEEVES SHALL BE 1650mm ND
 - 3) POSITION AND LEVELS OF EXISTING SERVICES ARE ESTIMATED CONTRACTOR SHALL EXPOSE ALL EXISTING SERVICES IN THE VICINITY OF THE PROPOSED JACKING POSITION. SERVICES SHALL BE SURVEYED AND RESULTS REPORTED TO THE ENGINEER BEFORE JACKING ESTABLISHMENT CAN COMMENCE.
 - 4) MINIMUM COVER OF SLEEVE / PIPE TO ROAD SURFACE SHALL BE 1500mm.
 - 5) MINIMUM COVER OF PIPE TO GROUND LEVEL IN ROAD RESERVE SHALL BE 1500mm .
 - 6) MINIMUM CLEARANCE TO OTHER SERVICES SHALL BE 500mm.
 - 7) CONTRACTOR TO PROVIDE ADEQUATE ROAD SIGNAGE DURING TENDER TO THE SATISFACTION OF THE ENGINEER.
 - 8) CONTRACTOR TO SURVEY AS BUILT LEVELS OF JACKED SLEEVES UNDER ROAD AND FORWARD RESULTS TO THE ENGINEER.

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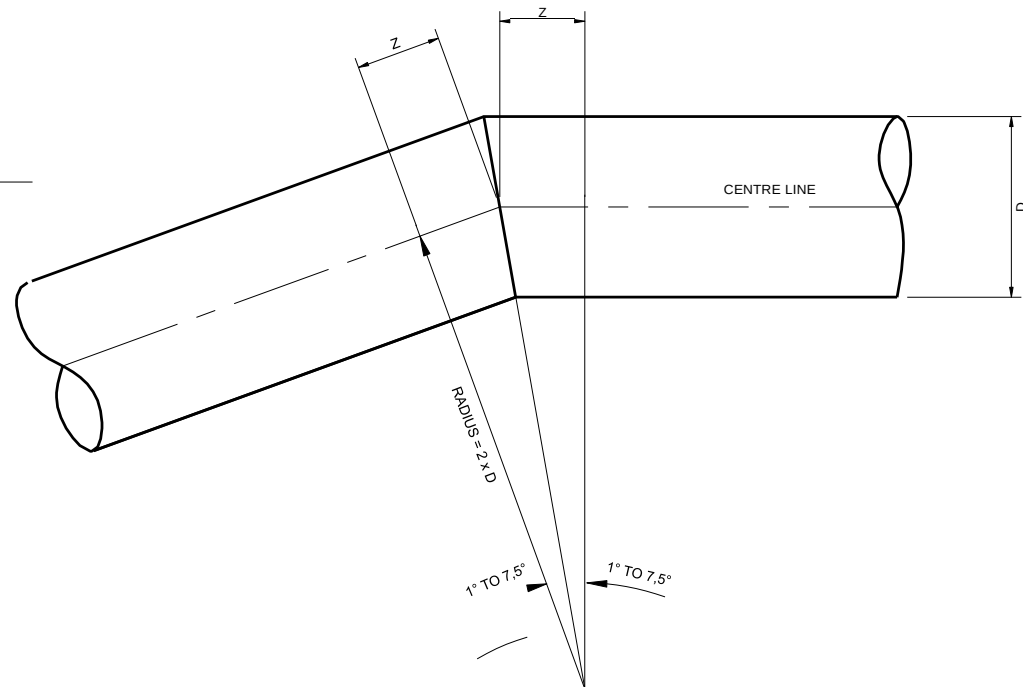
 MARISWE (Pty) Ltd P.O.Box 25549 Monument Park 0105 TEL: +27 (0) 12 424 9700	DESIGNED	C.F	09.04.2015	 Johannesburg Water	TURBINE HALL 65 NTEMI PILISO STREET NEWTOWN 2113 TEL: (011) 688-1542 FAX: (011) 688-6604	 JW14301R: LINBRO WATER UPGRADE ROAD CROSSING BY PIPE JACKING: SECTION 1	SCALE	REV:	AMENDMENTS	APPROVED DATE:	DRAWING-No. JW14301R-DET07-W01 JW14301R DET07 T PROJECT No. DRAWING No. REV. A1 SHEET 1 OF 1 ORIGINAL PAGE SIZE FILE No.
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	APPROVED BY:	K.GOVENDER	09/07/2024								
	ECSA REG. No.	201470227	DATE								
	CHECKED										
	APPROVED BY:	E.MUDAU	DATE								
	ECSA REG. No.										



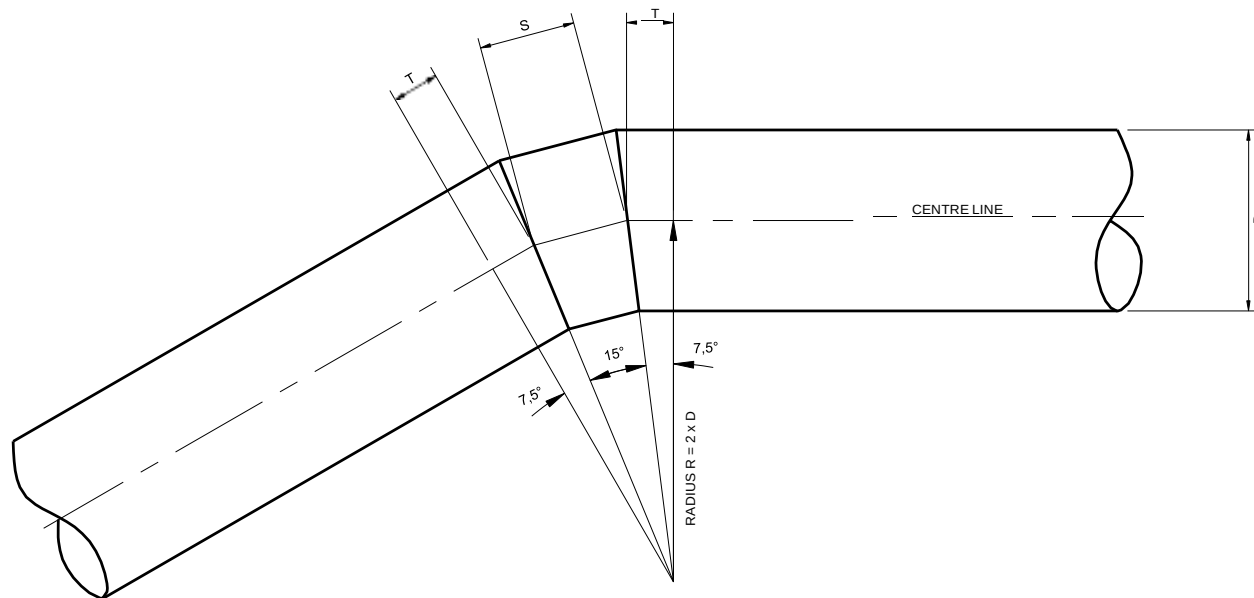
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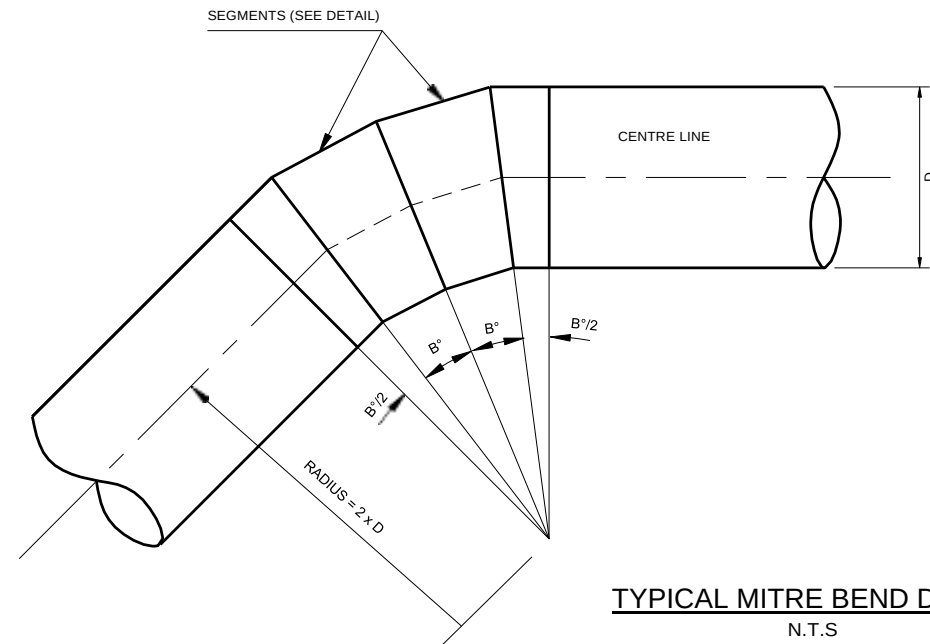
DETAIL OF SINGLE TAPER
N.T.S



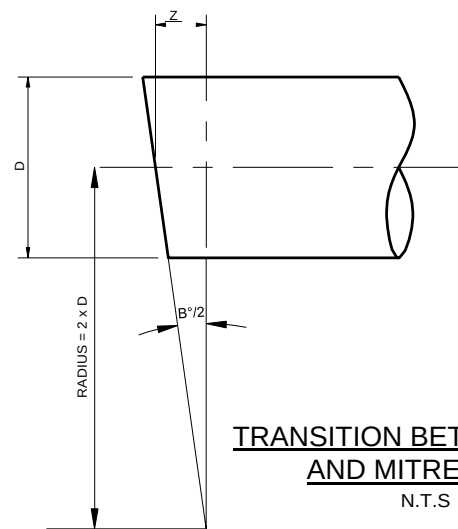
DETAIL OF SET
N.T.S



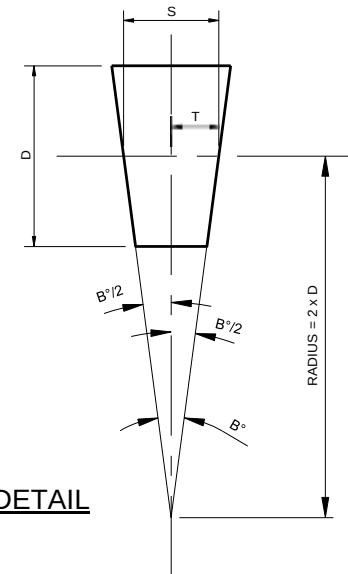
DETAIL OF 30 DEG. BEND
N.T.S



TYPICAL MITRE BEND DETAIL
N.T.S



**TRANSITION BETWEEN PIPE
AND MITRE BEND**
N.T.S



SEGMENT DETAIL
N.T.S

NOTE:
B° = 15° MAX
B°/2 = 7,5° MAX

EXAMPLE TO DETERMINE B AND NUMBER OF SEGMENTS

- a) 42° BEND
1) FROM TABLE 3: 2 SEGMENTS REQUIRED
2) $B°/2 + B°/2 + 2 \times B° = 42°$
 $B° = 14°$
 $B°/2 = 7°$
- b) 4° BEND
1) FROM TABLE 3: NO SEGMENTS
2) $B°/2 + B°/2 + 0 \times B° = 4°$
 $B° = 4°$
 $B°/2 = 2°$

NOTES :

SOCKETED PIPES - A SET BETWEEN 0° AND UP TO 3° SHALL BE TAKEN IN THE SOCKET
PLAIN ENDED PIPES - A SET BETWEEN 0° AND UP TO 2° SHALL BE FORMED BY MITRING ON THE
PIPE ENDS AND TRENCH BED BONED OUT TO SUIT
DEFLECTION ANGLE EXCEEDING 2° OR 3° AND UP TO 15° AS DETAILED

TABLE 1

TAPER DETAILS				
PIPE DIAMETER	D*	b*	c	d
2 100	2 100	1 400	2 450	1 490
1 400	1 400	1 000	1 400	1 400
1 200	1 200	800	1 400	1 200
		600	2 100	1 050
1 100	1 100	800	1 050	1 800
		600	1 750	1 050
900	900	600	1 050	650
900	900	400	1 750	650
800	800	600	700	650
800	800	400	1 400	650
700	700	600	350	650
700	700	400	1 050	550
600	600	400	700	550
500	500	300	700	500
400	400	300	350	500

NOTE: * REFERS TO INTERNAL DIAMETER OF PIPE

TABLE 2

30° BENDS DETAILS					
PIPE DIAMETER	D	T	S	Rad. R	Z
2 100	2 100	548	1096	4 200	TO BE CALCULATED INDIVIDUALLY
1 400	1 400	365	731	2 800	
1 200	1 200	313	627	2 400	
1 100	1 100	287	574	2 200	
900	900	235	470	1 800	
800	800	209	418	1 600	
700	700	183	365	1 400	
600	600	157	313	1 200	
500	500	131	261	1000	
400	400	104	209	800	
300	300	78	157	600	

TABLE 3

DEFLECTION °	NUMBER OF FULL SEGMENTS
> 0 - 15	0
> 15 - 30	1
> 30 - 45	2
> 45 - 60	3
> 60 - 75	4
> 75 - 90	5

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TURBINE HALL
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JW14301R: LINBRO WATER UPGRADES

STEEL PIPE TAPERS AND BENDS

SCALE	REV:	AMENDMENTS	APPROVED DATE:	DRAWING NO: JW14301R-DET08-W01
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JW14301R	DET08	T
PROJECT No.	DRAWING No.	REV.
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1. PREPARATION WELD ANGLES FOR ALL PIPE THICKNESS TO BE $30^{\circ} \pm 5^{\circ}$ ANGLE DENOTED BY 'A'.



(BITUMEN / SINTAKOTE COATED AND CEMENT MORTAR LINED)

NOTE:
MAKING GOOD OF JOINTS INTERNALLY

IMMEDIATELY BEFORE JOINING PIPES:

THE INTERNAL COATING AT THE JOINT SHALL BE COMPLETED BY APPLYING A SLURRY OF ORDINARY PORTLAND CEMENT MIXED WITH A SUITABLE SBR LATEX FOR USE WITH OPC (eg. NITOBOND SBR FROM FOSROC OR SIMILAR) AND CLEAN WATER IN THE PROPORTIONS 1:1 TO THE SHOULDERS OF THE CEMENT MORTAR LININGS IN THE SLEEVE AND SPIGOT ENDS OF THE PIPES TO BE JOINED.

SUFFICIENT SUITABLE MIX OF DRY PLASTER SAND (eg. NOEL LANCASTER B3) AND OPC IE CEM 1 32,5 USUALLY (1:1 BY MASS) AND SUFFICIENT LIQUID (ie NITOBOND SBR MIXED BY VOLUME 1:1 WITH WATER) TO PRODUCE CORRECT CONSISTENCY OF PLASTERING SHALL BE TROWELLED AGAINST THE SHOULDER OF THE CEMENT MORTAR LINING IN THE SLEEVE END.

IMMEDIATELY AFTER JOINING PIPES:

THE CEMENT MORTAR LINING IN THE SPIGOT END SHALL BE PRESSED AGAINST THE MORTAR (SEE STEP 2 ABOVE) IN THE SLEEVE END TO FORM A CONTINUOUS LINING.
EXCESS MORTAR COMPRESSED FROM THE JOINT IS TO BE REMOVED BY MEANS OF AN INTERNAL SCRAPER AND THE SURFACE SMOOTHED.

NOTE:

1. PRIMER SUITABLE FOR SUBSEQUENT WELDING, IN ACCORDANCE WITH SABS 926, MAY BE USED AS AN ALTERNATIVE TO ONE COAT BITUMEN PRIMER AND PROTECTIVE TAPE AS DETAILED.
2. PIPES FOR INSTALLATION ABOVE GROUND SHALL BE CLEANED AND PAINTED AT WORKS WITH TWO COATS OF PLASCON NAMELCOTE UC 53 ZINC CHROMATE PRIMER.

TABLE 1: RECOMMENDED CEMENT LINING THICKNESS

NOMINAL PIPE DIAMETER "D" (mm)	CEMENT MORTAR LINING	AR LINING
	THICKNESS "A" (mm)	TOLERANCE ± (mm)
300	10	2
500	10	2
900	12	2
1 100	14	2
1 500	18	2

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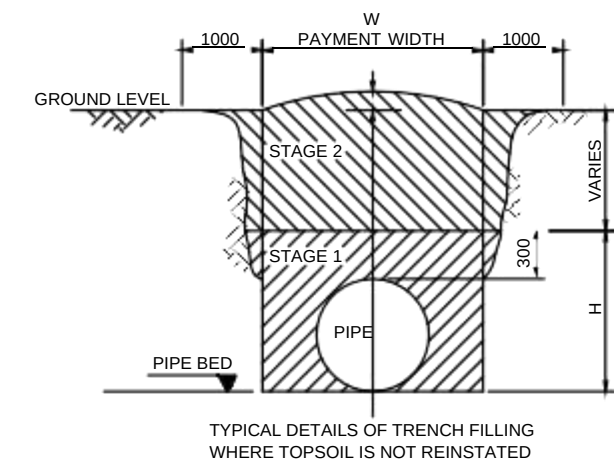
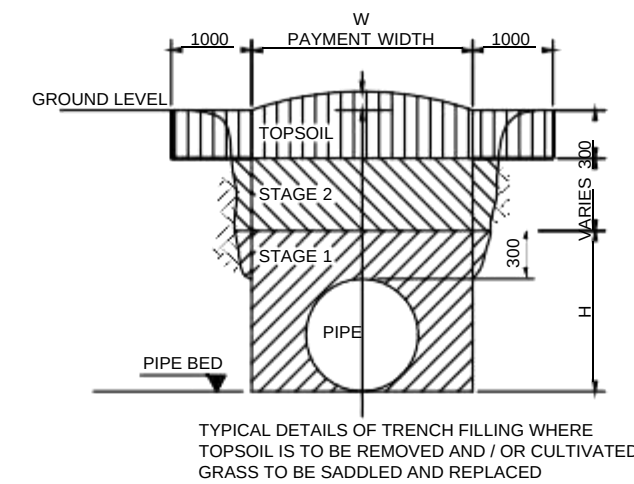
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JW14301R: LINBRO WATER UPGRADES

STEEL PIPES PROTECTIVE COATING, PIPE JOINTING FOR PLAIN AND BELL ENDED JOINTS AND MAKING GOOD OF JOINTS



DETAILS OF TENDER FOR THE ABOVE SHALL BE IN ACCORDANCE WITH THE FOLLOWING:-

ITEM	COMPOSITION OF FILL MATERIAL	MAXIMUM FINISH THICKNESS OF COMPACTION LAYER mm	DEGREE OF COMPACTION REQUIRED MOD AASHTO DENSITY AT OPTIMUM MOISTURE CONTENT	POSITION OF LAYER RELATIVE TO PIPE BED mm	CONSTRUCTIVE TOLERANCES RELATIVE TO PRESCRIBED LEVELS mm	
OVER EXCAVATION	COMPACTED SELECTED GRANULAR MATERIAL	200	90	BELOW PIPE BED	+0	-50
OVER EXCAVATION	COMPACTED SELECTED GRANULAR MATERIAL	200	90	BELOW TRENCH FLOOR	+0	-50
OVER BREAK: EITHER	COMPACTED SELECTED GRANULAR MATERIAL	200	90	BELOW TRENCH FLOOR	+0	-50
OR	38mm STONE	200	-	BELOW TRENCH FLOOR	+0	-50
SPECIFIED OVER EXCAVATION	38mm STONE	200	-	-150 TO -1000	+0	-50
PIPE BED FOUNDATION	COMPACTED SELECTED GRANULAR MATERIAL	150	90	0 TO -150	+0	-50
PIPE BED MIDDLE	COMPACTED SELECTED GRANULAR MATERIAL	60	90	PIPE BED LEVEL	+10	-10

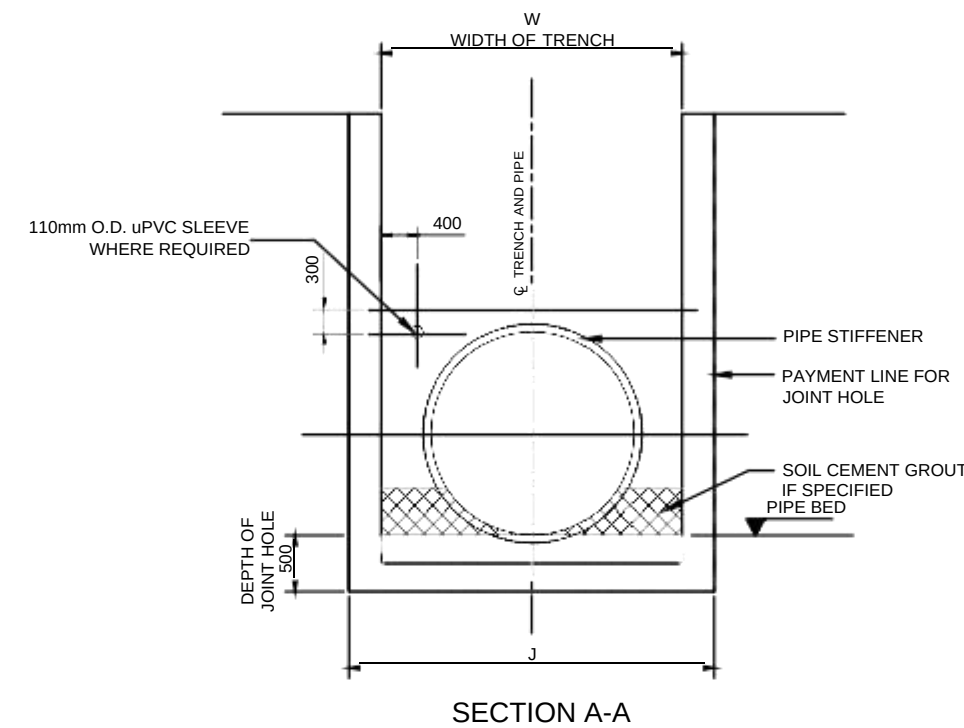


TABLE OF TRENCH WIDTHS FOR PIPE INSTALLED ALONG TOWNSHIP STREETS

PIPE DIAMETER	W (R)
≤ 600	1000
700	1100
800	1200
900	1300
1000	1400
1100	1500
1200	1600
1300	1700
1400	1800
1500	1900
1600	2000
1700	2100
1800	2200
1900	2300
2000	2400
2100	2500

NOTES:

1. THE DEGREE OF COMPACTION SPECIFIED FOR EACH PART OF THE WORKS SHOWN ON THIS DRAWING SHALL BE BASED UPON THE FOLLOWING METHODS OF TEST:
 - a) PERCENTAGE OF MODIFIED AASHTO DENSITY AT OPTIMUM MOISTURE CONTENT FOR GRADED SELECTED FILL
 - b) DENSITY OF CRUSHER RUN MEASURED BY AN APPROVED NUCLEAR DENSITY TESTER EXPRESSED AS A PERCENTAGE OF THE 'SOLID DENSITY' OR SPECIFIC GRAVITY OF THE UNCRUSHED MATERIAL
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED
1. THE MINIMUM WIDTH 'W' AND 'J' OF THE TRENCHES AND JOINT HOLES RESPECTIVELY AND THE MINIMUM HEIGHT 'H' OF STAGE 1 BACKFILLING SHALL BE AS FOLLOWS:

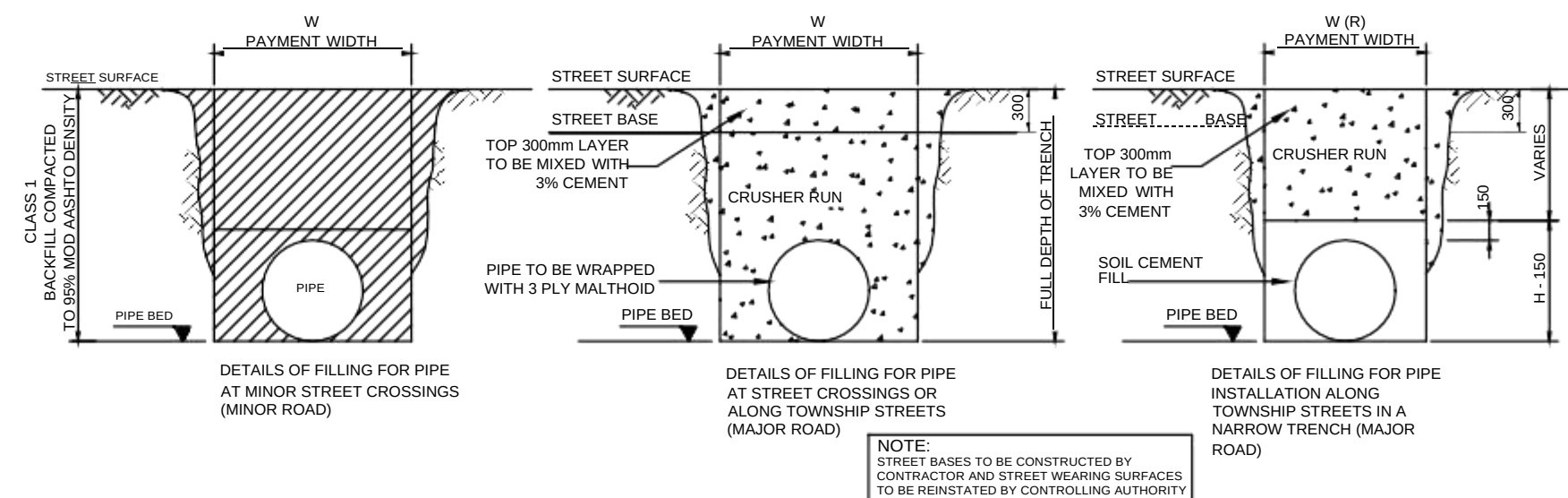
PIPE DIAMETER	W	J	H	PIPE DIAMETER	W	J	H
400	1200	1400	700	1200	2100	2400	1500
500	1300	1500	800	1300	2200	2500	1600
600	1400	1600	900	1400	2300	2600	1700
700	1500	1700	1000	1500	2400	2700	1800
800	1600	1800	1100	1600	2500	2800	1900
900	1700	1900	1200	1700	2600	2900	2000
1000	1900	2100	1300	1800	3000	3000	2100
1100	2000	2200	1400	1900	3100	3100	2200
				2000	3200	3200	2300
				2100	3300	3300	2400
				2300	3500	3500	2600

* NOTE: NUMBER AND SPACING OF STIFFENERS MAY VARY

THE WORK DETAILED ABOVE SHALL BE CARRIED OUT AS FOLLOWS:-

FILL ITEM	COMPOSITION OF FILL MATERIAL	MAXIMUM FINISH THICKNESS OF COMPACTION LAYER mm	DEGREE OF COMPACTION REQUIRED MOD AASHTO DENSITY AT OPTIMUM MOISTURE CONTENT (%)	CEMENT OR LIME STABILIZATION	CONSTRUCTIVE TOLERANCE RELATIVE TO PRESCRIBED LEVELS mm
STAGE 1	COMPACTED SELECTED FILL BLANKET	200	90*	NO	+50 -50
STAGE 2	BACKFILL	300	85*	NO	-50
TOPSOIL	TOPSOIL	300	85*	NO	-50
CRUSHER RUN	CRUSHER RUN	200	LIGHT	UPPER 300mm ONLY	-50
SOIL CEMENT	SOIL CEMENT	300	PUDPLE / VIBRATED	YES	+50 -50

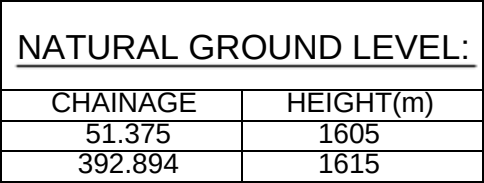
NOTE:
WHERE REQUIRED BY THE ENGINEER THE DEGREE OF
COMPACTION FOR STAGE 1 AND STAGE 2 SHALL BE
INCREASED TO 95% MOD AASHTO DENSITY



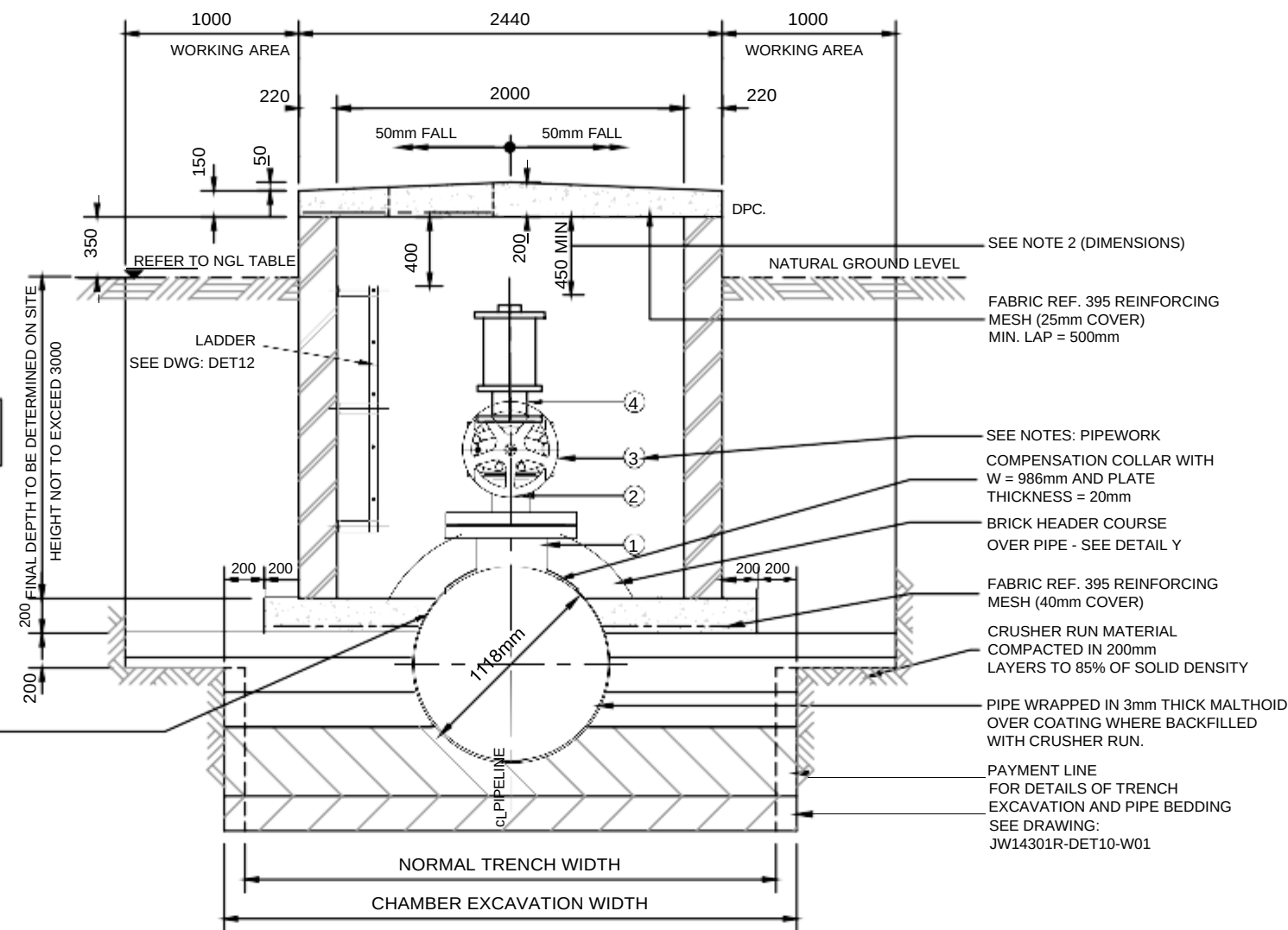
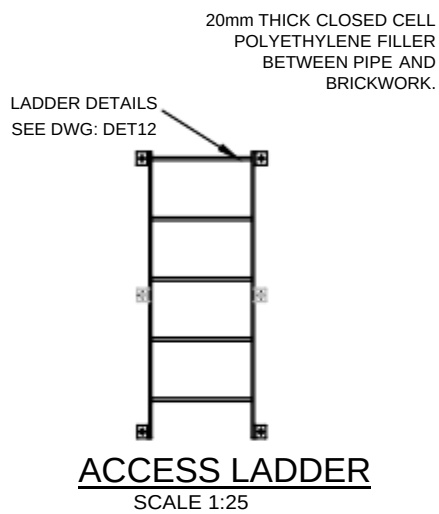
DETAILS OF FILLING OF TRENCHES AND REINSTATEMENT OF GROUND AND STREET SURFACES

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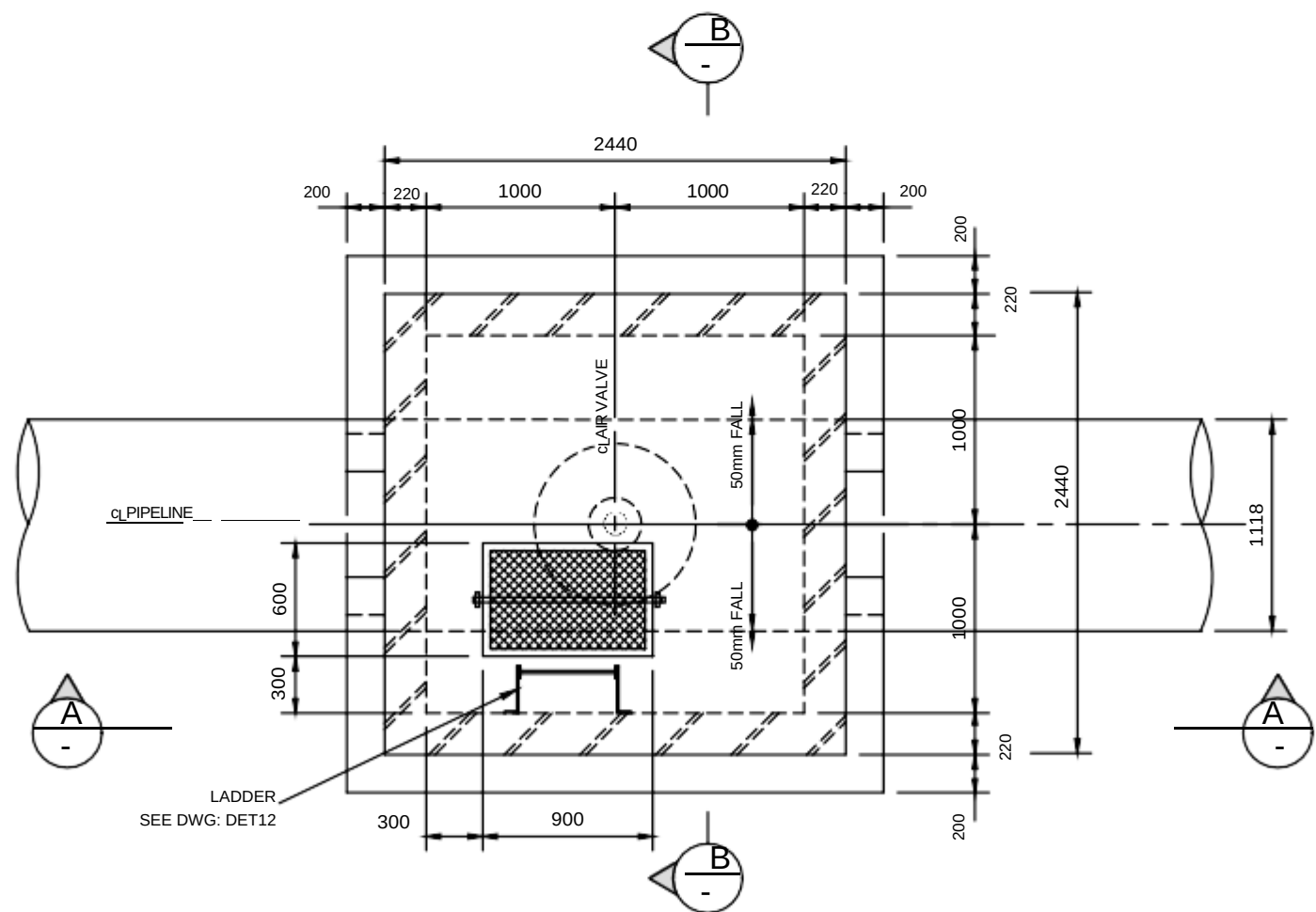
SECTION A-A
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SECTION B-B
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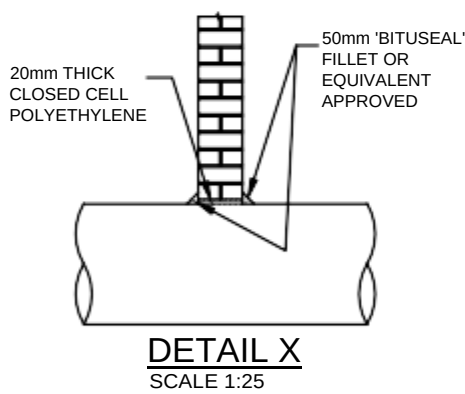
GENERAL NOTES:

1. ALL STEEL PIPES AND PIPE SPECIALS
SMALLER THAN 4000 TO BE MILD STEEL TO
SABS 62 HEAVY DUTY - WITH FLANGES TO
SABS 1123 TABLE 4000. THE PIPE SECTIONS TO
BE PROTECTED BY EITHER HOT-DIPPED
GALVANIZING (TO SABS- ISO 1461: 1999) OR BY
INTERNAL AND EXTERNAL COATING WITH KSIR
88 EPOXY COATING (FOUR LAYERS OF 125
MICRON EACH).

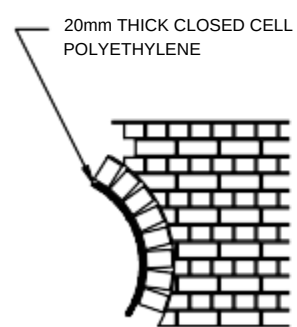


PLAN ON ROOF
SCALE 1:25

BRICK CHAMBER



DETAIL X
SCALE 1:25



DETAIL Y
SCALE 1:25

NOTES

BRICK CHAMBERS:
BRICKWORK:

1. SABS227 - (1986) HARD BURNT LOW WATER ABSORPTION (BELOW 7%) ENGINEERING GRADE FACING BRICK (e.g. "MAIZE TRAVERTINE" EX COROBRICK) & CLASS 1 MORTAR.
2. THE CONTRACTOR SHALL FURNISH THE ENGINEER WITH A SAMPLE OF THE BRICK FOR APPROVAL PRIOR TO WORK
3. ENGLISH BOND BELOW GROUND LEVEL.
4. STRETCHER BOND ABOVE GROUND LEVEL TO ACHIEVE FACE BRICKWORK ON BOTH FACES.
5. JOINTS TO BE FULLY FILLED. (FACE OF BRICK IN CONTACT SHALL BE FULLY MORTARED SO THAT VERTICAL JOINTS ARE COMPLETELY FILLED)
6. EXPOSED BRICKWORK TO BE JOINTED. (HOLLOW KEY JOINTED)
7. A BRICK GAUGE OF 85mm TO BE USED.
8. BRICKFORCE REQUIRED EVERY FOUR COURSES.
9. A FULL CIRCULAR ARCH OF HEADER FACE BRICKS AROUND PIPES.
10. DURING TENDER NO PART TO STAND MORE THAN 2 COURSES HIGHER THAN ADJOINING WALLS.
11. 4 NO CLAY VERMIN PROOF AIR VENTS TO BE PROVIDED IN EACH WALL.

STEELWORK:

1. ACCESS LADDER AS PER DRAWING JW14301R-DET12
2. ALL STEELWORK TO BE GALVANIZED IN ACCORDANCE WITH SABS 763 - 1977

MORTAR:

1. MIX PROPORTIONS :- DRY SAND : CEMENT = 4:1
2. HORIZONTAL JOINTS = 10mm NOMINAL

CONCRETE:

1. 28 DAY COMPRESSIVE STRENGTH = 20 MPa
2. COVER TO REINFORCEMENT. ROOF 25mm, FLOOR = 40mm
3. CURING FOR 7 DAYS (minimum)
4. NO PLACEMENT OF CONCRETE PRIOR TO ENGINEER'S INSPECTION OF EXPOSED SURFACES AND REINFORCEMENT.
5. 25mm x 25mm CHAMFER TO ALL EXPOSED EDGES.

DIMENSIONS:

1. A MINIMUM OF FOUR COURSES ABOVE GROUND LEVEL.
2. A MINIMUM CLEARANCE OF 450mm ABOVE THE TOP OF ANY INSTALLED AIR VALVES.
3. A MINIMUM CLEARANCE OF 500mm SHALL BE PROVIDED BETWEEN THE SIDE OF THE VALVE AND THE FACE OF THE BRICKWORK.
4. CHAMBER DEPTH IS NOT TO EXCEED 3m.

PIPEWORK:

1. REDUCING TEE 1100/550mm. 550mm BRANCH FLANGED, 800mm C.T.F 4000 kPa MAIN STEEL PLAIN ENDED FOR WELDING, INCLUDING COMPENSATION COLLAR WITH W = 986mm and T = 20mm. CORROSION PROTECTION: AS FOR MAIN PIPE
2. BLANK FLANGE WITH DN200 SPACER PIPE WELDED ON, 300mm LONG, BOTH ENDS FLANGED, FLANGES 550mm ND and 200mm ND WITH A WALL THICKNESS OF 12mm, FLANGE DRILLED TO SANS 1123 (4000 kPa) EPOXY LINED AND COATED
3. 200mm ND WEDGE GATE VALVE, CLASS 40, FLANGED, DRILLED TO SANS 1123 TABLE 4000/3.
4. 200mm ND CLASS 40, DOUBLE ACTION, ANTI-SHOCK AIR VALVE (VENT-O-MAT RBX OR SIMILAR), FLANGED.

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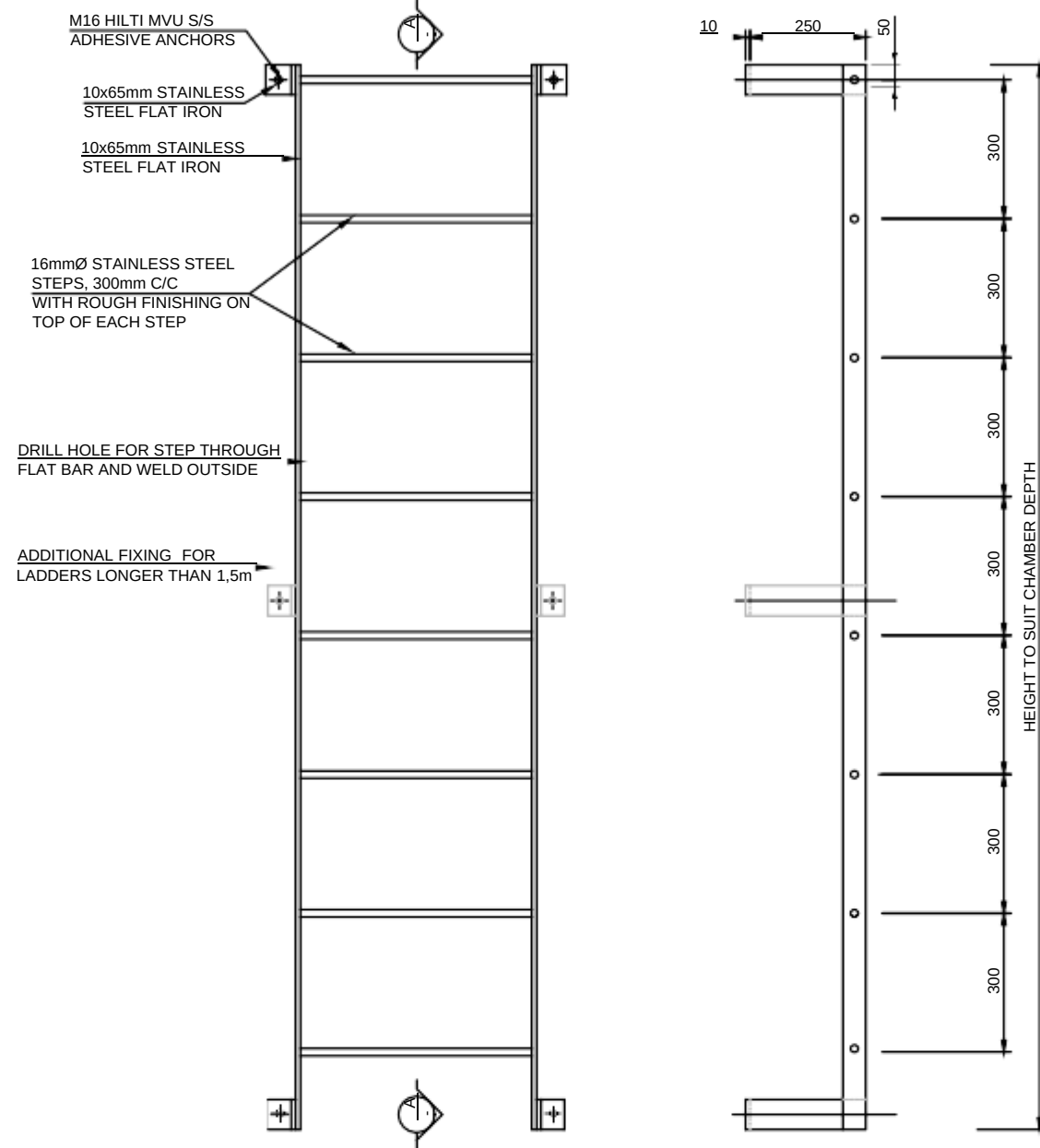
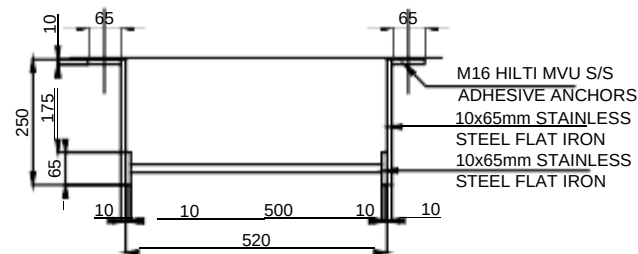
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AIR VALVE CHAMBER
ON 1100mm ND PIPE

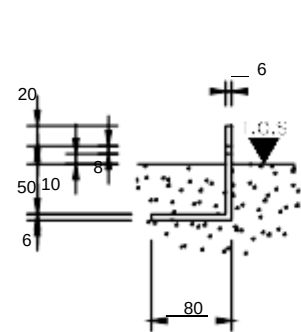
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FRONT ELEVATION
SCALE 1:10

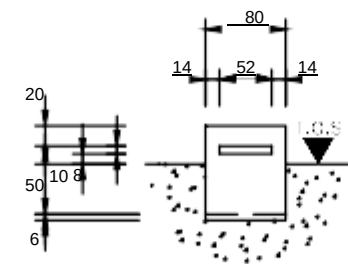
SECTION A-A
SCALE 1:10

TYPICAL ACCESS LADDER FOR CHAMBERS

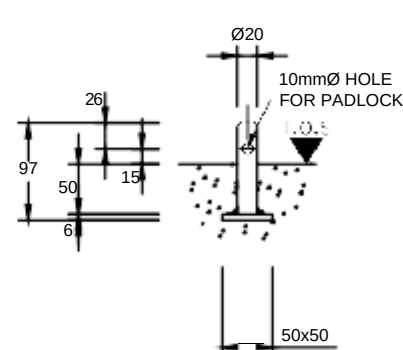


SIDE ELEVATION

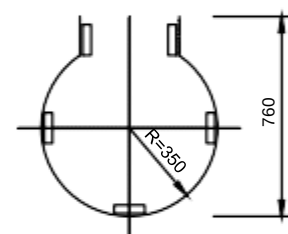
FIXING LUG FOR LOCKING BARS
SCALE 1:5



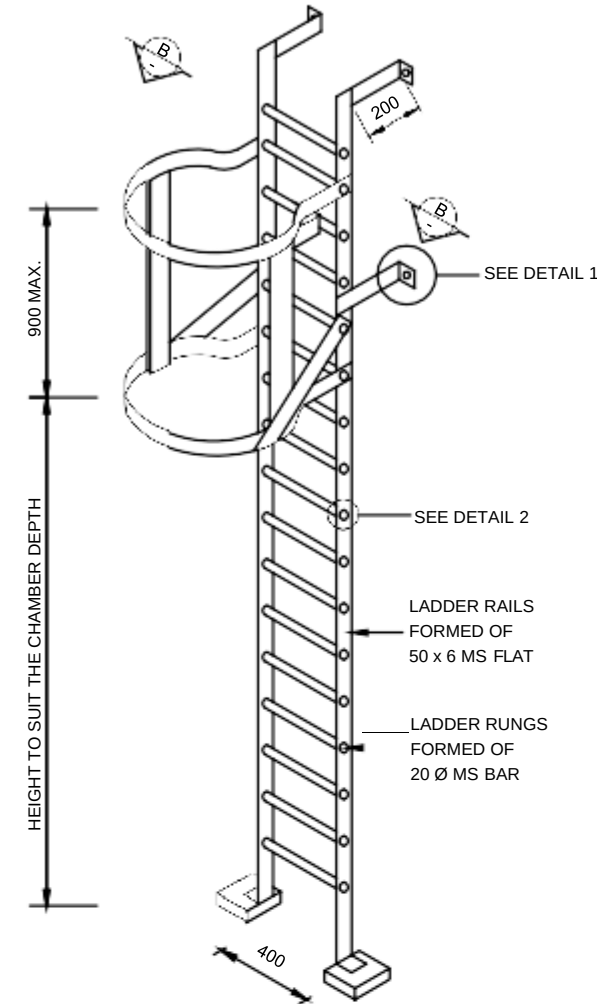
FRONT ELEVATION



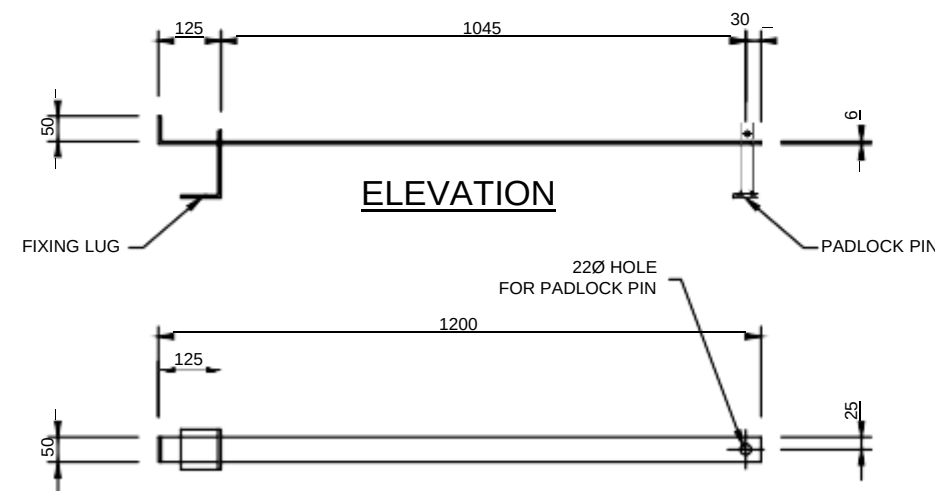
PADLOCK PIN DETAIL
SCALE 1:5



HOOP PLAN VIEW
SCALE : N.T.S

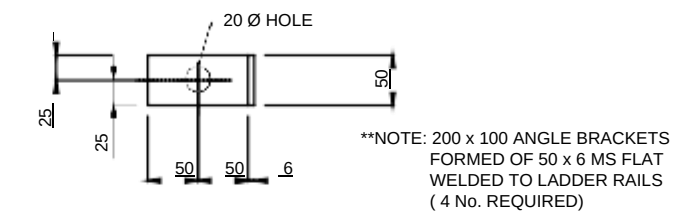


INTERNAL LADDER
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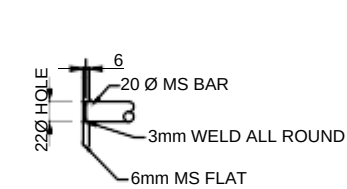


ELEVATION

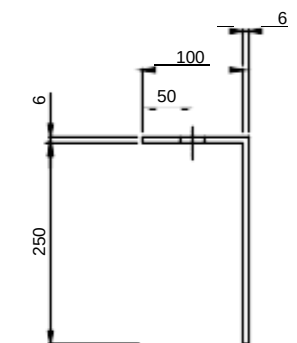
PLAN
LOCKING BAR
SCALE 1:10



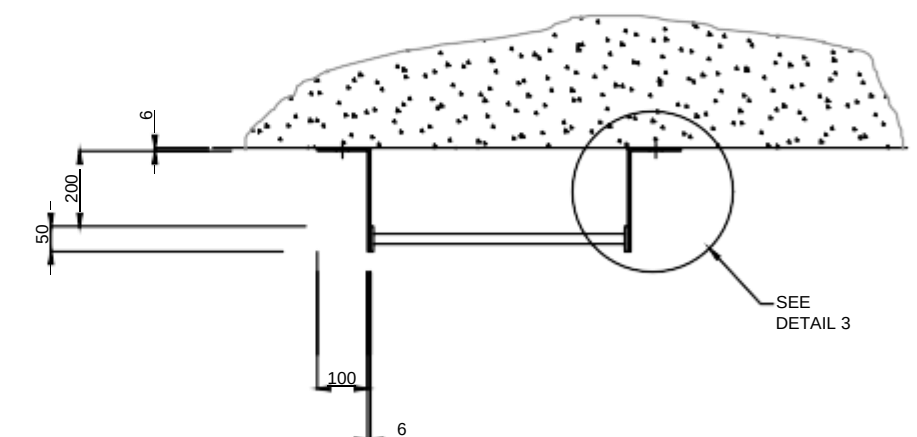
DETAIL 1: MOUNTING BRACKET
SCALE 1:5



DETAIL 2
SCALE 1:5



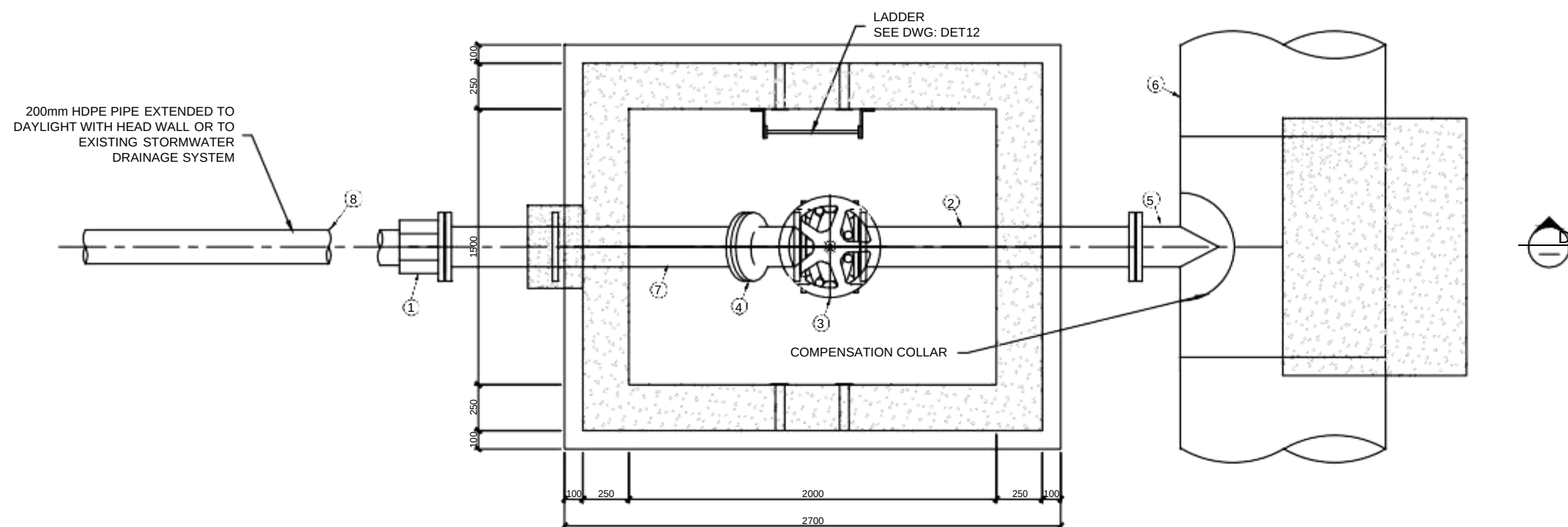
DETAIL 3
SCALE 1:5



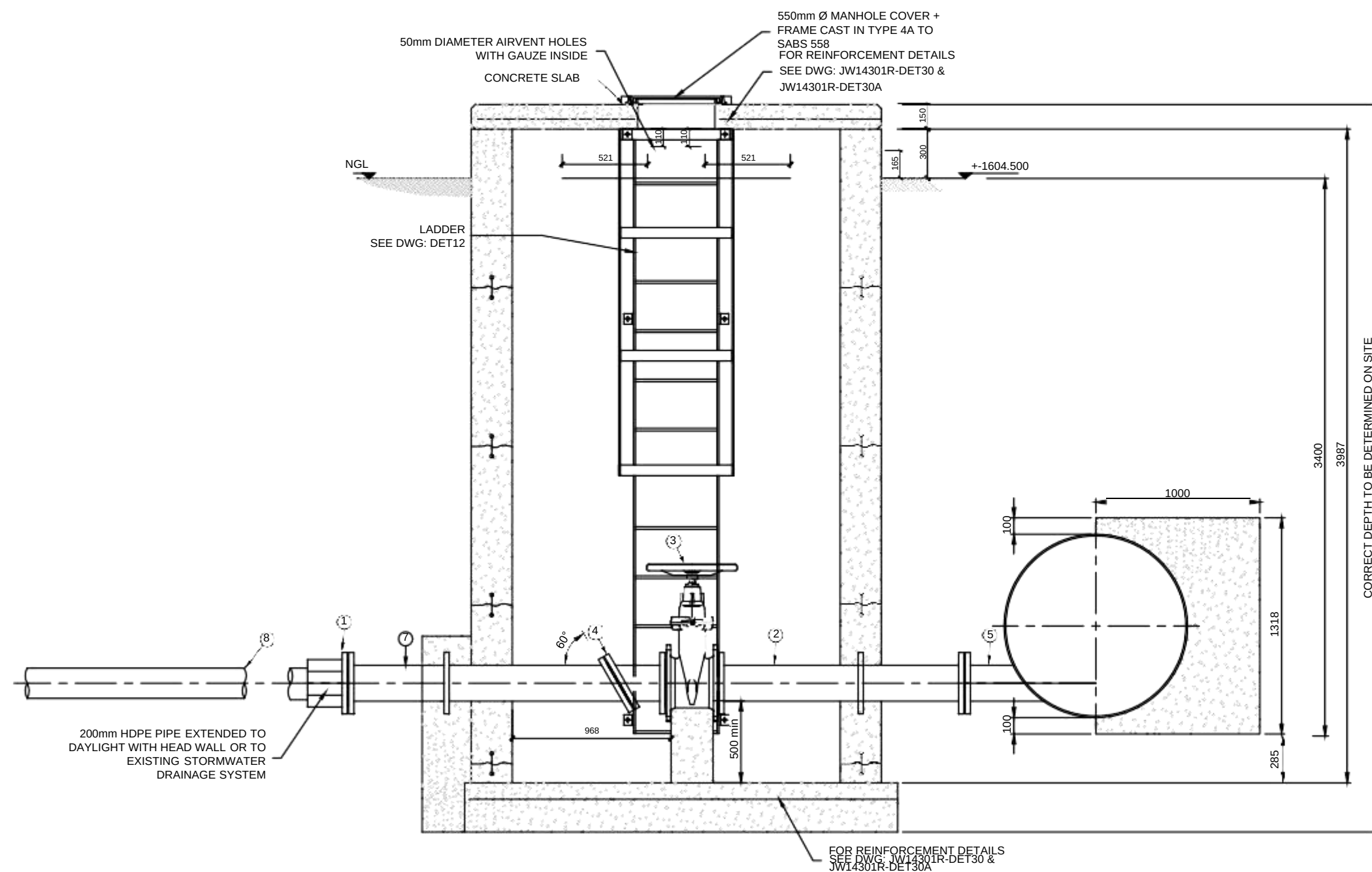
SECTION B-B
SCALE 1:10

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PLAN
SCALE 1:20



SECTION  D
SCALE 1:20
SCOUR CHAMBER DETAIL

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SCALE	REV:	AMENDMENTS	APPROVED DATE:	DRAWING No: JW14301R-DET13-W01			
N.T.S	T	ISSUE FOR TENDER	12/07/2024				
				JW14301R DET13 — T			
				PROJECT No. DRAWING No. REV.			
				A1 SHEET 1 OF 1			
				ORIGINAL PAGE SIZE FILE No.			

GENERAL NOTES:

NO	NOTES
1.	CONCRETE SLABS CLASS 25/19
2.	ALL EXPOSED CORNERS TO BE CHAMFERED 25mm
3.	COVER TO ALL REINFORCEMENT- 40mm MIN.
4.	CHAMBER CONSTRUCTED OF BRICK MASONRY, PRE-CAST OR INSITU CAST CONCRETE.
5.	ALL STEELWORK TO BE HOT- DIPPED GALVANIZED TO SABS- ISO 1461 1999.
6.	AIR VENTILATION HOLES MUST BE COVERED ON THE INSIDE WITH EXPANDED SHEETING "MENTAX" HAVING A MAXIMUM 8x10mm OPENINGS 2mm WIDE x 1mm THICK STRANDS. THE SHEETING SHOULD BE FIXED WITH 6mm DIAMETER SCREWS AND PLUGS. TO BE APPROVED BY ENGINEER BEFORE INSTALLATION.
7.	ALL STEEL PIPES AND PIPE SPECIALS SMALLER THAN 400ND TO BE MILD STEEL TO SANS 719, GRADE C, WITH FLANGES TO SABS 1123 TABLE 4000. THE PIPE SECTION TO BE PROTECTED BY EITHER HOT-DIPPED GALVANIZED (TO SABS ISO 1461:1999) OR BY INTERNAL AND EXTERNAL COATING WITH KSIR 88 EPOXY COATING (FOUR LAYERS OF 125 MICRON EACH.
8.	ALL BURIED STEEL FITTINGS AND GALVANISED PIPES TO BE PROTECTED AGAINST CORROSION BY WRAPPING IT IN DENSO TAPE WITH 55% OVERLAPPING.

GENERAL NOTES (Concrete):

1. ALL REINFORCEMENT MUST BE INSPECTED AND APPROVED BY THE ENGINEER BEFORE ANY CONCRETE IS CAST.
 2. COVER TO REINFORCEMENT MUST BE 40 mm.
 3. WHERE JOINTS ARE MADE IN THE ROOF SLAB, U-BARS MUST BE USED TO JOIN TOP AND BOTTOM REINFORCEMENT IN ROOF SLAB.
 4. CONTRACTOR SHALL ADVISE THE ENGINEER ABOUT THE ACTUAL DEPTH FOR EACH INSTALLATION SO THAT REINFORCEMENT DETAILS AND BENDING SCHEDULES CAN BE ISSUED.
 5. ALL EXPOSED CORNERS TO BE CHAMFERED.
- FOR CHAMBERS LOCATED IN AGGRESSIVE ENVIRONMENT (ACIDIC) THE FOLLOWING SPECIFICATION TO BE USED :
- 5a. SULPHATE RESISTANT CEMENT TO BE USED.
 - 5b. DOLOMITE AGGREGATES OR SIMILAR FOR pH RESISTANT AGGREGATES TO BE USED.

NOTES:
GENERAL NOTES:

- ii. ALL SPECIAL FINISHINGS SHALL BE MADE OF STEEL AS SPECIFIED
 - iii. CORROSION PROTECTION
 - 1. RPU
 - 2. RIGID POLYURETHANE
 - iiii. FLANGE ADAPTORS AND VALVES SHALL BE CLASS 25 AS SPECIFIED AND SHALL BE EPOXY COATED TO COMPLY WITH THE REQUIREMENTS OF SABS 1217.
 - v. ALL FLANGES SHALL BE TO SABS 1123 TABLE 4000
 - vi. ALL BOLTS AND NUTS SHALL BE GALVANISED STEEL AND SHALL BE TO SABS 1700-5
- BRICKWORK :**
- 1. SABS227 - (1986) HARD BURNT LOW WATER ABSORPTION (BELOW 7%) ENGINEERING GRADE FACE BRICK (e.g. "MAIZE TRAVERTINE" EX COROBRIK) & CLASS 1 MORTAR.
 - 2. THE CONTRACTOR SHALL FURNISH THE ENGINEER WITH A SAMPLE OF THE BRICK FOR APPROVAL PRIOR TO WORK COMMENCING. ENGLISH BOND BELOW GROUND LEVEL.
 - 3. STRETCHER BOND ABOVE GROUND LEVEL TO ACHIEVE FACE BRICK - WORK ON BOTH FACES.
 - 4. JOINTS TO BE FULLY FILLED.(FACE OF BRICK IN CONTACT SHALL BE FULLY MORTARED SO THAT VERTICAL JOINTS ARE COMPLETELY FILLED)
 - 5. EXPOSED BRICKWORK TO BE JOINTED (HOLLOW KEY JOINTED)
 - 6. A BRICK GAUGE OF 83mm TO BE USED.
 - 7. BRICKWORK REQUIRED EVERY FOUR COURSES.
 - 8. A FULL CIRCULAR ARCH OF HEADER FACE BRICKS AROUND PIPES.
 - 9. DURING TENDER NO PART TO STAND MORE THAN 2 COURSES HIGHER THAN ADJOINING WALLS.

STEELWORK

1. 20mm DIAMETER HOT DIPPED GALVANISED MILD STEEL RUNGS TO BE BUILT IN EVERY FOUR COURSES AS WORK PROCEEDS.
2. ALL STEELWORK TO BE GALVANISED IN ACCORDANCE WITH SABS 763 - 1977

MORTAR

1. MIX PROPORTIONS :- DRY SAND : CEMENT = 3.5:1
HORIZONTAL JOINTS = 10mm NOMINAL

CONCRETE

1. 28 DAY COMPRESSIVE STRENGTH = 20 MPA
2. COVER TO REINFORCEMENT. ROOF 25mm,FLOOR = 40mm
3. CURING FOR 7 DAYS (minimum)
4. NO PLACEMENT OF CONCRETE PRIOR TO ENGINEER'S INSPECTION OF EXPOSED SURFACES AND REINFORCEMENT .
5. 25mm x 25mm CHAMFER TO ALL EDGES.

DIMENSIONS

1. A MINIMUM OF FOUR COURSES ABOVE GROUND LEVEL.
2. A MINIMUM CLEARANCE OF 450mm ABOVE THE TOP OF ANY INSTALLED VALVES.
3. A MINIMUM CLEARANCE OF 500mm SHALL BE PROVIDED BETWEEN THE SIDE OF THE VALVE AND THE FACE OF THE BRICKWORK.
4. CHAMBER DEPTH IS NOT TO EXCEED 3m.

SCOUR VALVE PIPE DETAILS

ITEM	No OFF.	DIAM (mm)	DESCRIPTION
1	1	200x200	STEEL TO HDPE FLANGE ADAPTOR
2	1	200	FLANGED DISTANCE PIECE 1500mm LONG, PUDDLE FLANGE 620mm FROM ONE END DRILLED TO TABLE 4000 SANS 1123.
3	1	200	WEDGE GATE VALVE, CLASS 40,
4	1	200	PIPE SECTION FLANGED ONE END, (285mm LONG, 60° FLANGE SPOOL PIECE OTHER END, DRILLED TO TABLE 4000 SANS 1123.
5	1	1100 X 200	REDUCING TEE, FLANGED ON ONE END (200mm) OTHER END PLAIN. INCLUDING COMPENSATION COLLAR.
6	1	1100	MAIN PIPE
7	1	200	PUDDLE PIPE 1650mm LONG, FLANGED ONE END WITH 60° FLANGE SPOOL PIECE OTHER END. DRILLED TO, FLANGE DRILLED TO TABLE 4000 SANS 1123, WITH PUDDLE FLANGE 600mm FROM ONE END.
8	1	200	HDPE CLASS 16 SPACER PIECE



BRICK CHAMBER

[illegible]

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DESIGNED	W.K	19/05/2014
DRAWN	W.K	19/05/2014
CHECKED	K.G	14/02/2019
APPROVED BY: K.GOVENDER	 SIGNATURE	09/07/2024 DATE
ECSA REG. No.	201470227	
CHECKED		
APPROVED BY: E.MUDAU		
	SIGNATURE	DATE
ECSA REG. No.		

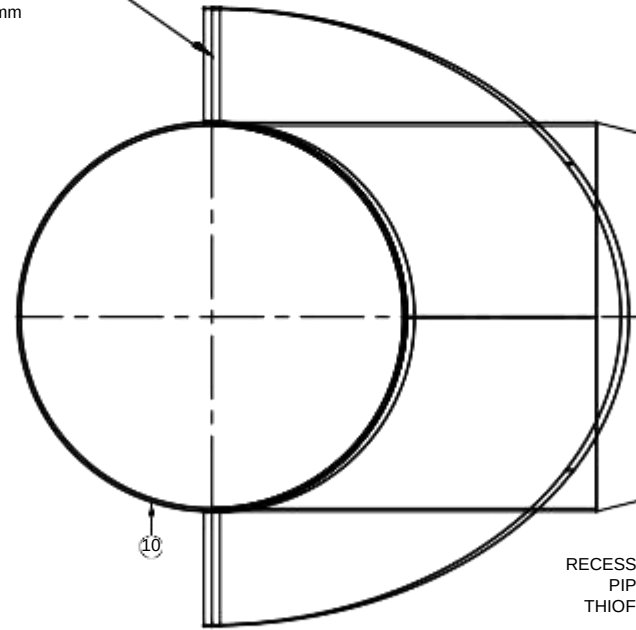
TEL: (011) 688-1542
FAX: (011) 688-6604

JW14301R: LINBRO WATER UPGRADES

AIR VALVE CHAMBER
ON 1000mm ND PIPE

PIPE AND FITTING SCHEDULE							
ITEM No.	No. OFF	DIAMETER	MATERIAL	WALL THICKNESS	DESCRIPTION	SKETCH	CORROSION PROTECTION INTERNAL EXTERNAL
1	1	900 x 100	STEEL	12mm	REDUCING TEE, MAIN STEM 400mm LONG, BRANCH 300mm LONG, TWO ENDS FLANGED AS SHOWN, ONE END PLAIN WELDED WITH COMPENSATION COLLAR.		E E
2	1	900	SG IRON		WEDGE GATE VALVE WITH OPEN SPUR GEARBOX, F TO F 1000mm , FLANGED, PN 40		E E
3	2	900	STEEL	12mm	PIPE SECTION FLANGED ALL ENDS, (2000mm o.a LONG) 60° FLANGE SPOOL PIECE OTHER END. DRILLED TO TABLE 4000 SANS 1123.		E E
4	1	900 x 100	STEEL	12mm	REDUCING TEE, MAIN STEM 800mm		E E
5	2	100	STEEL				E E
6	1	100	STEEL	8mm			E E
7	1	100	SG IRON				E E
8	1	100	STEEL	8mm			E E
9	1	100	STEEL	8mm			E E
10	1	1500 x 1500	STEEL	12mm	WELDED, COMPLETE WITH CROTCH PLATE: STEEL THICKNESS=50mm WYE/BASE DEPTH=1253mm TOP DEPTH=454mm		E E
11	2	900	STEEL	12mm	PUDDLE PIPE, 1600mm LONG, ALL ENDS PLAIN WELDED WITH PUDDLE PIPE 600mm FROM OUTER END.		E E
12	1	1100 x 900	STEEL	12mm	REDUCER, 1235mm LONG, ENDS PLAIN WELDED.		E E
13	1	1500 x 900	STEEL	12mm	REDUCER, 1260mm LONG, ENDS PLAIN WELDED.		E E
NOTES: THE DEPTH OF CHAMBER TO BE CONFIRMED ON SITE THE MINIMUM COVER OF CHAMBER ABOVE GROUND TO BE CONFIRMED ON SITE							

CROTCH PLATE
STEEL THICKNESS = 50mm
WYE DEPTH / BASE DEPTH = 1253mm
TOP DEPTH = 454mm



RECESS 30 x10 mm DEEP AROUND THE PIPE FILLED WITH JOINT SEALANT THIOFLEX 600 OR OTHER APPROVED

PVC 150 mm PLAIN WEB WATERSTOP

COMPENSATION COLLAR FOR BRANCH: PLATE WIDTH = 190mm, PLATE THICKNESS = 10mm

12 No 50mmØ uPVC AIR VENTILATION HOLES COVERED INSIDE WITH EXPANDED "MENTAX" SHEETING (MAX. OPENING OF 8 x 10) AND 2mm WIDE x 1mm THICK STRANDS TO BE APPROVED BY ENGINEER BEFORE INSTALLATION. TO BE FIXED TO WALL.

100mm WIDE U12 KAYMAT GEOTEXTILE (OR SIMILAR) WITH APPROVED SEALING SOLVENT

VALVE SURFACE BOX (VALVE KEY HOLE 128mm ND), CAST INTO THE CONCRETE LID, POSITION DIRECTLY ABOVE VALVE OPERATION SPINDLE

MANHOLE COVER AND FRAME SABS 558 TYPE 1B INCLUDING LOCKING BAR.

SEE DETAIL BELOW

CP MONITORING POINT

CHAMBER BOUNDARY VIA 16mm² BLACK INSULATED COPPER CABLE

SECTION VIEW

Scale 1 : 20

400mm x 400mm x 400mm SUMP
50 mm BLINDING LAYER CLASS 15/19 POLYOLEFIN FILM FOR DAMP-PROOFING TO SABS 952
COMPENSATION COLLAR FOR BRANCH: PLATE WIDTH = 190mm, PLATE THICKNESS = 10mm

GENERAL NOTES:

- ALL SPECIAL FITTINGS SHALL BE MADE OF STEEL AS SPECIFIED
- CORROSION PROTECTION
E EPOXY LINING / COATING
RPU RIGID POLYURETHANE
- FLANGE ADAPTORS AND VALVES SHALL BE CLASS 40 AS SPECIFIED AND SHALL BE EPOXY COATED TO COMPLY WITH THE REQUIREMENTS OF SABS 1217.
- ALL FLANGES SHALL BE TO SABS 1123 TABLE 4000
- ALL BOLTS AND NUTS SHALL BE GALVANISED STEEL AND SHALL BE TO SABS 1700-5
- CONCRETE CHAMBER 5.0m x 2.5m INTERNAL MINIMUM DEPTH AS PER PIPE AND FITTING SCHEDULE TABLE.

GENERAL NOTES (Concrete):

- ALL REINFORCEMENT MUST BE INSPECTED AND APPROVED BY THE ENGINEER BEFORE ANY CONCRETE IS CAST.
- COVER TO REINFORCEMENT MUST BE 40 mm.
- ALL OPENINGS INCLUDING MANHOLE COVER OPENINGS IN SLAB/WALL MUST HAVE ADDITIONAL REINFORCEMENT BARS MARKED 19 AS SHOWN ON DETAIL OF WALL AND ROOF OPENINGS.
- WHERE JOINTS ARE MADE IN THE ROOF SLAB, U-BARS MUST BE USED TO JOIN TOP AND BOTTOM REINFORCEMENT IN ROOF SLAB.

ISSUE FOR TENDER ONLY



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DESIGNED	L de J	20/05/2014
DRAWN	W.T	20/05/2014
CHECKED	K.G	14/02/2019
APPROVED BY:	K.GOVENDER	09/07/2024
ECSA REG. No.	201470227	
CHECKED		
APPROVED BY:	E.MUDAU	
ECSA REG. No.		



17 HARRISON STREET
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2107

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JW14301R: LINBRO WATER UPGRADE
(ISOLATION VALVE CHAMBER AND INCLUDING OFF TAKE)

SCALE	REV:	AMENDMENTS	APPROVED DATE:	DRAWING No: JW14301R-DET15-W01
1:40	T	ISSUE FOR TENDER	12/07/2024	ISSUED FOR TENDER
				JW14301R
				DET15
				T
				PROJECT No.
				DRAWING No.
				REV.
				A1
				SHEET
				1
				OF
				1
				ORIGINAL PAGE SIZE
				FILE No.

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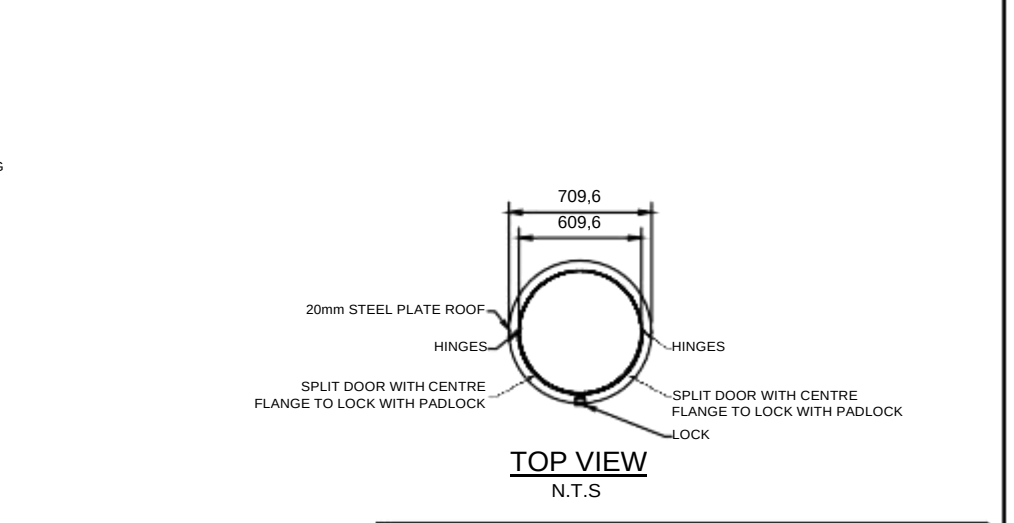
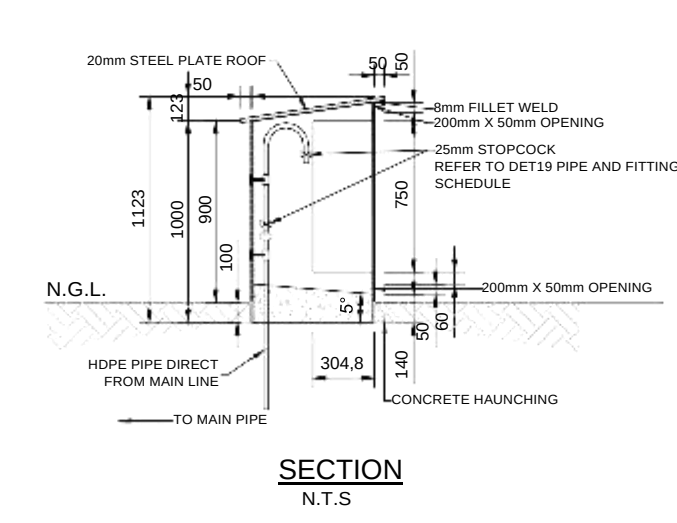
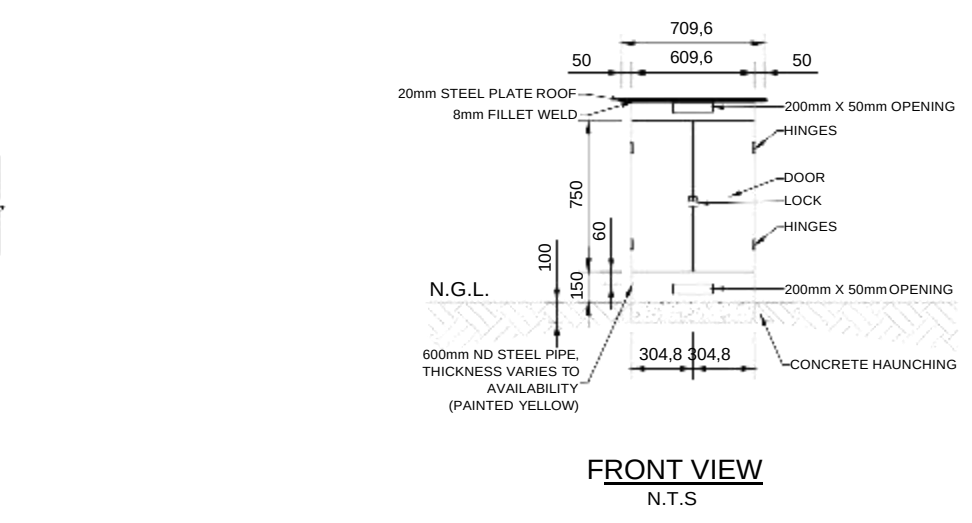
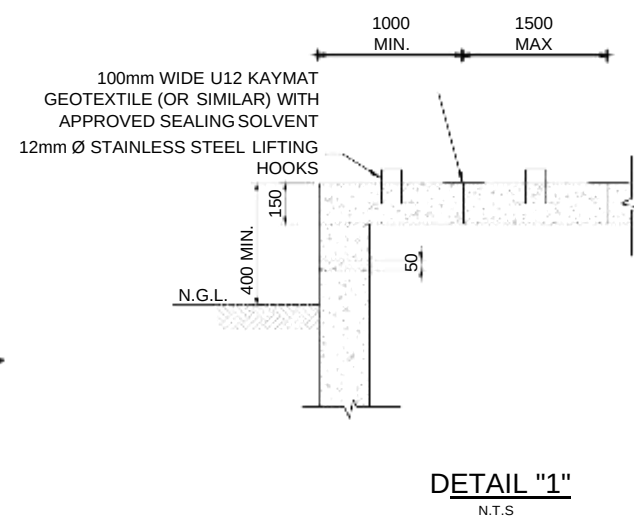
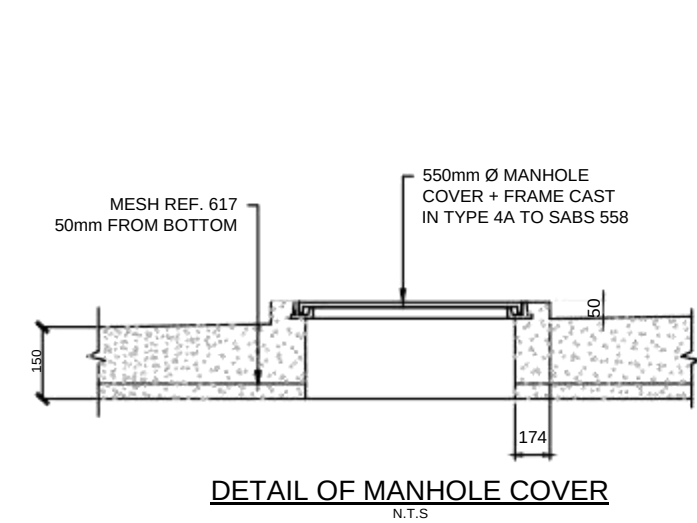
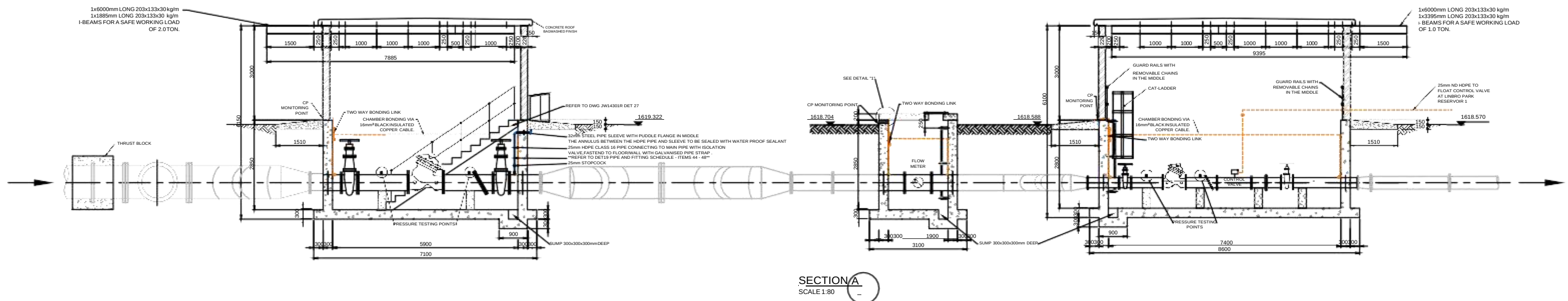
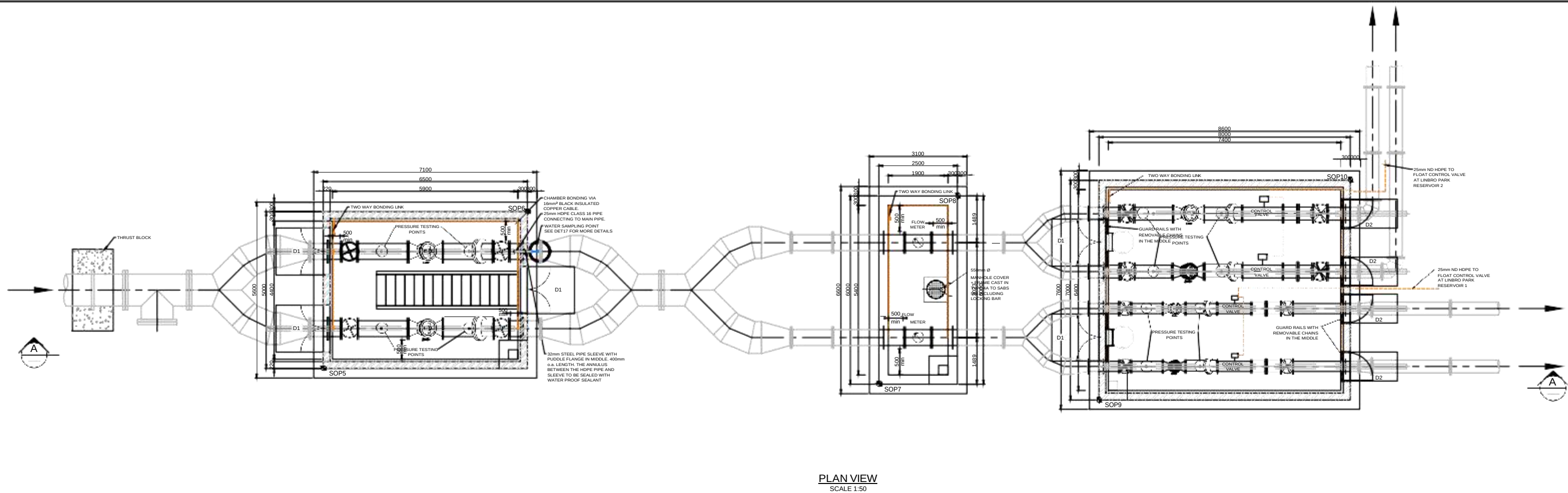
GENERAL NOTES (Concrete):

- ALL REINFORCEMENT MUST BE INSPECTED AND APPROVED BY THE ENGINEER BEFORE ANY CONCRETE IS CAST.
- COVER TO REINFORCEMENT MUST BE 40 mm.
- ALL OPENINGS INCLUDING MANHOLE COVER OPENINGS IN SLAB/WALL MUST HAVE ADDITIONAL REINFORCEMENT BARS.
- WHERE JOINTS ARE MADE IN THE ROOF SLAB, U-BARS MUST BE USED TO JOIN TOP AND BOTTOM REINFORCEMENT IN ROOF SLAB.
- CONTRACTOR SHALL ADVISE THE ENGINEER ABOUT THE ACTUAL DEPTH FOR EACH INSTALLATION SO THAT REINFORCEMENT DETAILS AND BENDING SCHEDULES CAN BE ISSUED.

BRICKWORK:

- SABS227 - (1986) HARD BURNT LOW WATER ABSORPTION (BELOW 7%) ENGINEERING GRADE FACING BRICK (e.g. "MAIZE TRAVERTINE" EX COROBRICK) & CLASS 1 MORTAR.
- THE CONTRACTOR SHALL FURNISH THE ENGINEER WITH A SAMPLE OF THE BRICK FOR APPROVAL PRIOR TO WORK
- ENGLISH BOND BELOW GROUND LEVEL.
- STRETCHER BOND ABOVE GROUND LEVEL TO ACHIEVE FACE BRICKWORK ON BOTH FACES.
- JOINTS TO BE FULLY FILLED. (FACE OF BRICK IN CONTACT SHALL BE FULLY MORTARED SO THAT VERTICAL JOINTS ARE COMPLETELY FILLED)
- EXPOSED BRICKWORK TO BE JOINTED. (HOLLOW KEY JOINTED)
- A BRICK GAUGE OF 85mm TO BE USED.
- BRICKFORCE REQUIRED EVERY FOUR COURSES.
- A FULL CIRCULAR ARCH OF HEADER FACE BRICKS AROUND PIPES.
- DURING TENDER NO PART TO STAND MORE THAN 2 COURSES HIGHER THAN ADJOINING WALLS.
- 4 No CLAY VERMIN PROOF AIR VENTS TO BE PROVIDED IN EACH WALL.

SETTING OUT DATA		
NAME	Y	X
SOP5	86698.994	2888554.773
SOP6	86703.929	2888548.445
SOP7	86698.620	2888537.461
SOP8	86704.507	2888535.054
SOP9	86698.176	2888530.604
SOP10	86705.077	2888522.822



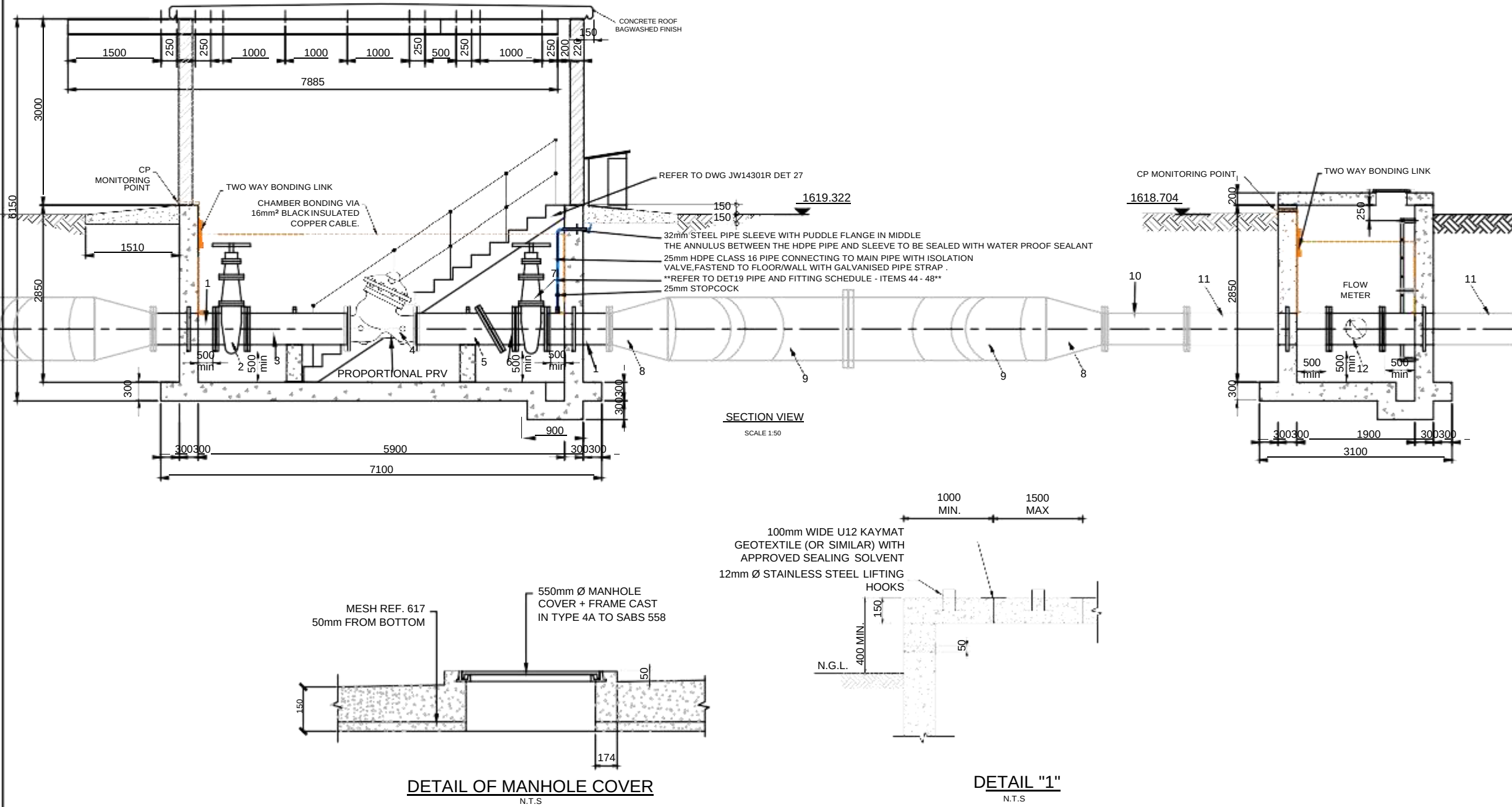
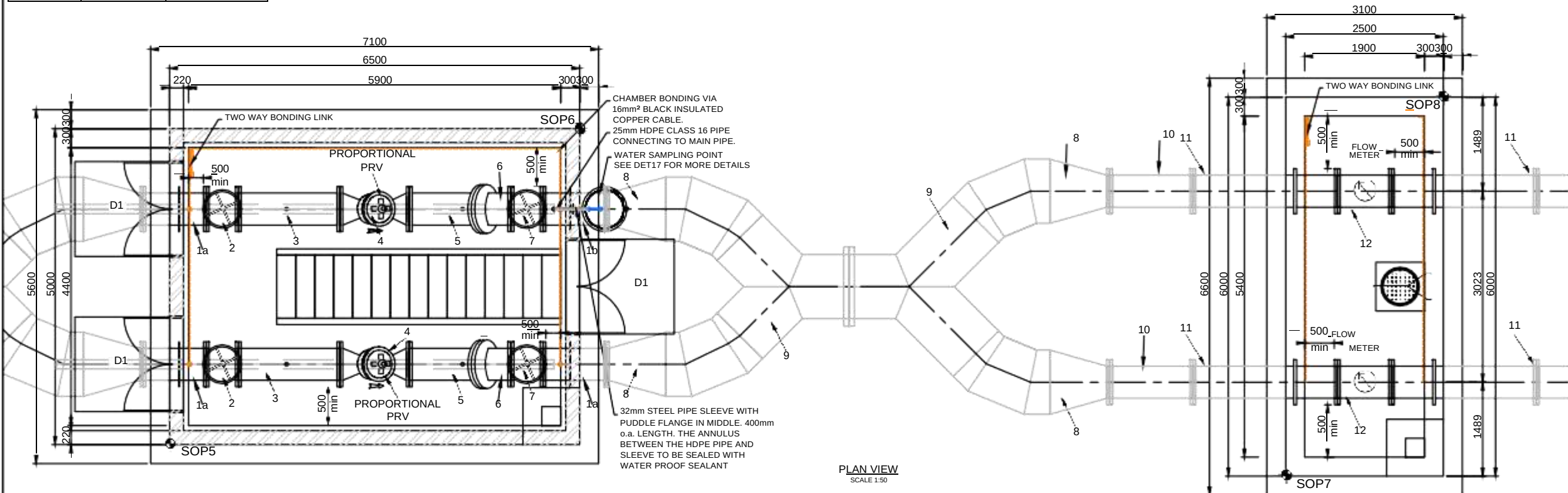
REFER TO DET19 PIPE AND FITTING SCHEDULE - ITEMS 44 - 48

 MARISWE (Pty) Ltd P.O.Box 25549 Monument Park 0105 TEL: +27 (0) 12 424 9700	DESIGNED	W.K	06.06.2016	 Johannesburg Water	TURBINE HALL 65 NTEMI PILISO STREET NEWTOWN 2113 TEL: (011) 688-1542 FAX: (011) 688-6604	 JW14301R: LINBRO WATER UPGRADES PRESSURE REDUCING AND RESERVOIR CONTROL VALVE CONFIGURATION AT LINBRO PARK & ALEXANDRA RESERVOIR COMPLEX	SCALE	REV:	AMENDMENTS	APPROVED DATE:	DRAWING-No. JW14301R-DET17-W01 JW14301R PROJECT No. A1 DRAWING No. DET17 SHEET 1 OF 3 ORIGINAL PAGE SIZE FILE No.
	DRAWN	W.K	06.06.2016				AS SHOWN	T	ISSUE FOR TENDER	12/07/2024	
	CHECKED	K.G	14/02/2019								
	APPROVED BY	K.GOVENDER	09/07/2024								
	ECSA REG. No.	201470227									
	CHECKED										
	APPROVED BY	E.MUDAU									
	ECSA REG. No.										

SETTING OUT DATA		
NAME	Y	X
SOP5	86698.994	2888554.773
SOP6	86703.929	2888548.445
SOP7	86698.620	2888537.461
SOP8	86704.507	2888535.054

SETTING OUT DATA		
NAME	Y	X
SOP5	86698.994	2888554.773
SOP6	86703.929	2888548.445
SOP7	86698.620	2888537.461
SOP8	86704.507	2888535.054

NOTE:
FOR REINFORCEMENT DETAILS. SEE DWG:
JW14301R-DET32, JW14301R-DET32A
JW14301R-DET33, JW14301R-DET33A
JW14301R-DET34 & JW14301R-DET34A



ITEM No.	No. OFF	PIPE ND mm	MATERIAL	WALL THICKNESS	DESCRIPTION	SKETCH	CORROSION PROTECTION	
							INTERNAL	EXTERNAL
1a	3	500	X52	12mm	PUDDLE PIPE, 1000mm LONG, FLANGED BOTH ENDS, WITH PUDDLE FLANGE IN THE MIDDLE. FLANGED TO SANS 1123 TABLE 4000/3		E	E
1b	1	500	X52	12mm	PUDDLE PIPE, 1000mm LONG, FLANGED BOTH ENDS, WITH PUDDLE FLANGE. WATER SAMPLING POINT 25mm NIPPLE WELDED ON WITH THREADED CAP. FLANGED TO SANS 1123 TABLE 4000/3		E	E
2	2	500	STEEL		WEDGE GATE VALVE, PN 40, FLANGED.		E	E
3	2	500	X52	12mm	STEEL PIPE, 1605 mm LONG F TO F WITH PRESSURE TESTING POINT 25mm NIPPLE WELDED ON WITH THREADED CAP. FLANGED TO SANS 1123 TABLE 4000/3		E	E
4	2	500	STEEL		PRESSURE REDUCING VALVE, PN40, FLANGED PROPORTIONAL PRV, COMPLETE WITH PRESSURE TRANSDUCER.		E	E
5	2	500	X52	12mm	STEEL PIPE, 1605 mm o.a. ONE END 60° FLANGE SPOOL PIECE, WITH 2x 25mm NIPPLE WELDED ON WITH THREADED CAP. FLANGED TO SANS 1123 TABLE 4000/3.		E	E
6	2	500	X52		PIPE SECTION FLANGED ONE END, (400mm o.a LONG) 60° FLANGE SPOOL PIECE OTHER END. DRILLED TO TABLE 4000 SANS 1123.		E	E
7	2	500	STEEL		WEDGE GATE VALVE, PN 16, FLANGED		E	E
8	4	500/1000	X52	12mm	REDUCER. FLANGED ONE SIDE, PLAIN ENDED THE OTHER SIDE. FLANGED TO SANS 1123 TABLE 1600/3		E	E
9	2	1000	X52	12mm	SPECIAL GUSSET Y-PIECE, FLANGED ONE END, PLAIN ENDED ON THE TWO BRANCH SIDES. FLANGED TO SANS 1123 TABLE 1600/3		E	E
10	2	500	X52	12mm	PIPE SECTION, 1520mm o.a. FLANGED BOTH ENDS, FLANGED TO SANS 1123 TABLE 1600/3		E	E
11	4	500	X52	12mm	PUDDLE PIPE, 2286mm LONG, FLANGED BOTH ENDS, WITH PUDDLE FLANGE IN THE MIDDLE. FLANGED TO SANS 1123 TABLE 1600/3		E	E
12	2	500	STEEL		EMF FLOW METER, PN 16, FLANGED, COMPLETE WITH FLANGE INSULATION KITS	FLOW METER 	E	E

GENERAL NOTES:

1. ALL SPECIAL FITTINGS SHALL BE MADE OF STEEL AS SPECIFIED
2. CORROSION PROTECTION
E EPOXY LINING
RPU TWO LAYER COATING WITH VISCO-ELASTIC CORROSION
PROTECTION AND GLASS REINFORCING EPOXY
3. FLANGE ADAPTORS AND VALVES SHALL BE CLASS 25 UNLESS
OTHERWISE SPECIFIED AND SHALL BE EPOXY COATED TO COMPLY
WITH THE REQUIREMENTS OF SABS 1217.
4. ALL FLANGES SHALL BE TO SABS 1123 TABLE 2500 OR TABLE 4000
AS SPECIFIED.
5. ALL BOLTS AND NUTS SHALL BE GALVANISED STEEL AND SHALL
BE TO SABS 1700-5

BRICKWORK:

1. SABS227 - (1986) HARD BURNT LOW WATER ABSORPTION (BELOW 7%) ENGINEERING GRADE FACING BRICK (e.g. "MAIZE TRAVERTINE" EX COROBRICK) & CLASS 1 MORTAR.
2. THE CONTRACTOR SHALL FURNISH THE ENGINEER WITH A SAMPLE OF THE BRICK FOR APPROVAL PRIOR TO WORK
3. ENGLISH BOND BELOW GROUND LEVEL.
4. STRETCHER BOND ABOVE GROUND LEVEL TO ACHIEVE FACED BRICKWORK ON BOTH FACES.
5. JOINTS TO BE FULLY FILLED. (FACE OF BRICK IN CONTACT SHALL BE FULLY MORTARED SO THAT VERTICAL JOINTS ARE COMPLETELY FILLED)
6. EXPOSED BRICKWORK TO BE JOINTED. (HOLLOW KEY JOINTED)
7. A BRICK GAUGE OF 85mm TO BE USED.
8. BRICKFORCE REQUIRED EVERY FOUR COURSES.
9. A FULL CIRCULAR ARCH OF HEADER FACE BRICKS AROUND PIPES.
10. DURING TENDER NO PART TO STAND MORE THAN 2 COURSES HIGHER THAN ADJOINING WALLS.
11. 4 NO CLAY VERMIN PROOF AIR VENTS TO BE PROVIDED IN EACH WALL.

ISSUE FOR TENDER ONLY

[illegible]

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0105
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DESIGNED	W.K	06.06.2016
DRAWN	W.K	06.06.2016
CHECKED	K.G	14/02/2019
APPROVED BY: K.GOVENDER	 SIGNATURE	09/07/2024 DATE
ECSA REG. No.	201470227	
CHECKED		
APPROVED BY: E.MUDAU		
	SIGNATURE	DATE
ECSA REG. No.		



TURBINE HALL
65 NTEMI PILISO STREET
NEWTOWN
2113

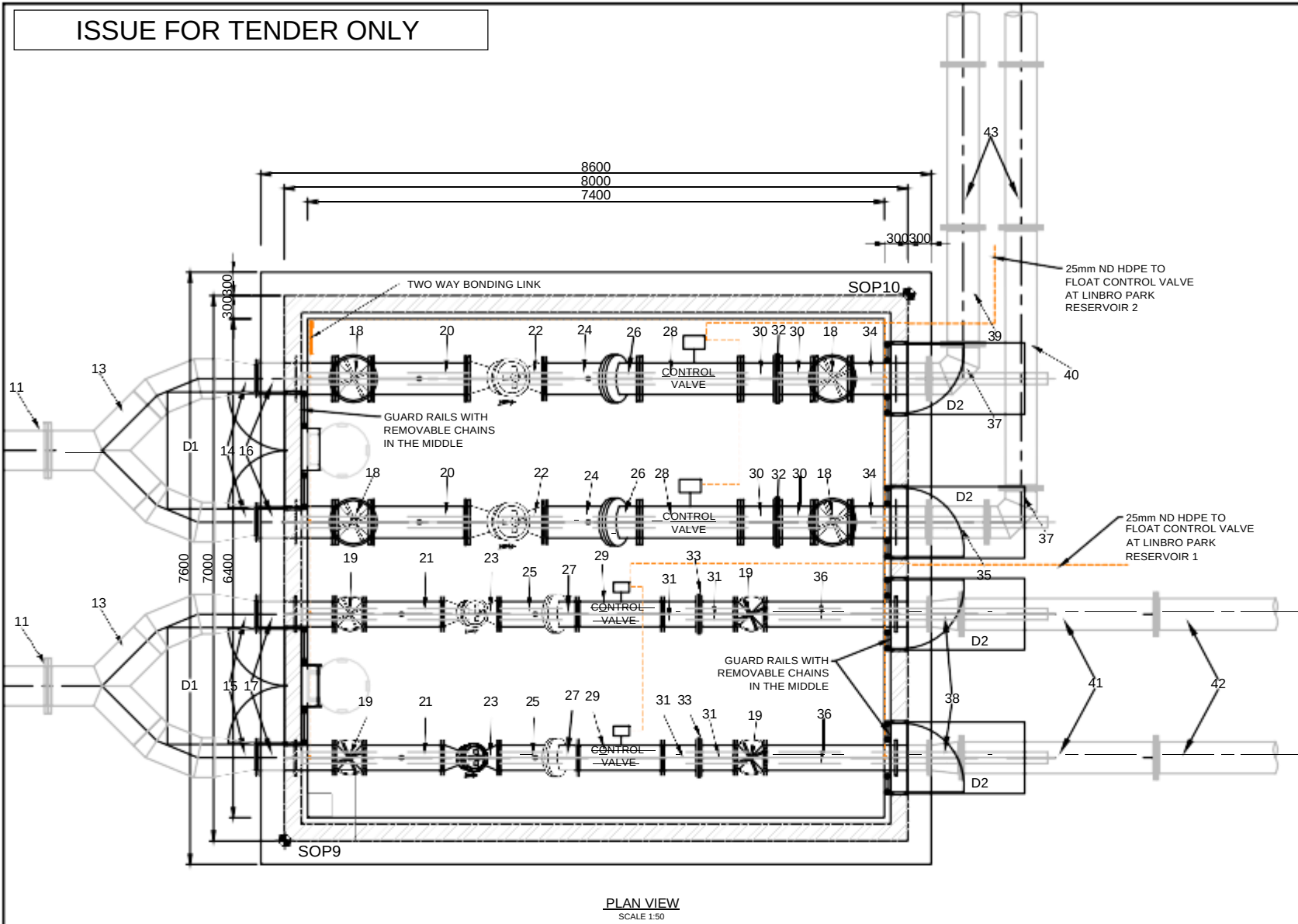
TEL: (011) 688-1542
FAX: (011) 688-6604

Joburg

JW14301R: LINBRO WATER UPGRADES

PRESSURE REDUCING AND FLOW METER PIPE SCHEDULE
AT LINBRO PARK & ALEXANDRA RESERVOIR COMPLEX

ISSUE FOR TENDER ONLY

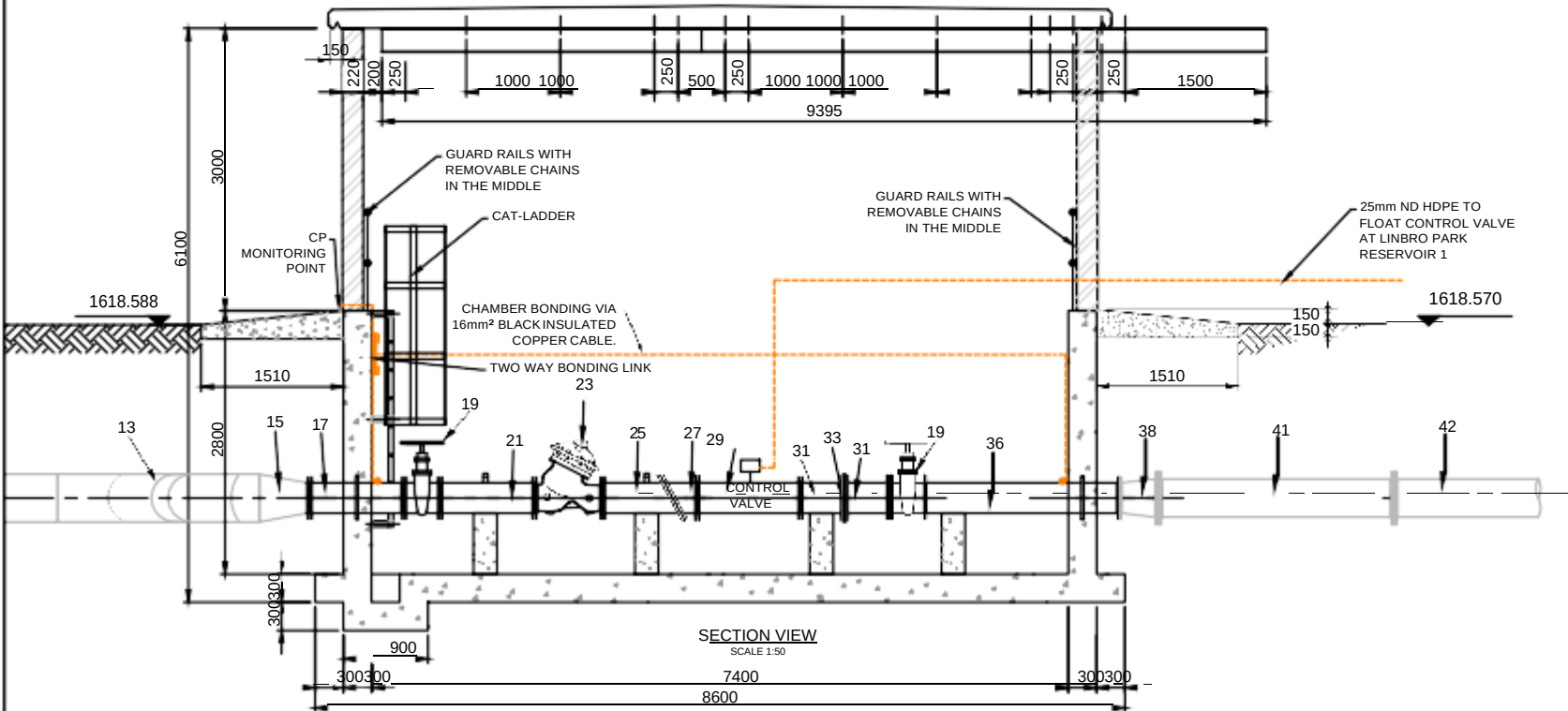


PLAN VIEW
SCALE 1:50

SETTING OUT DATA

NAME	Y	X
SOP9	86698.176	2888530.604
SOP10	86705.077	2888522.822

NOTE:
FOR REINFORCEMENT DETAILS. SEE DWG:
JW14301R-DET35, JW14301R-DET35A
JW14301R-DET36, JW14301R-DET36A

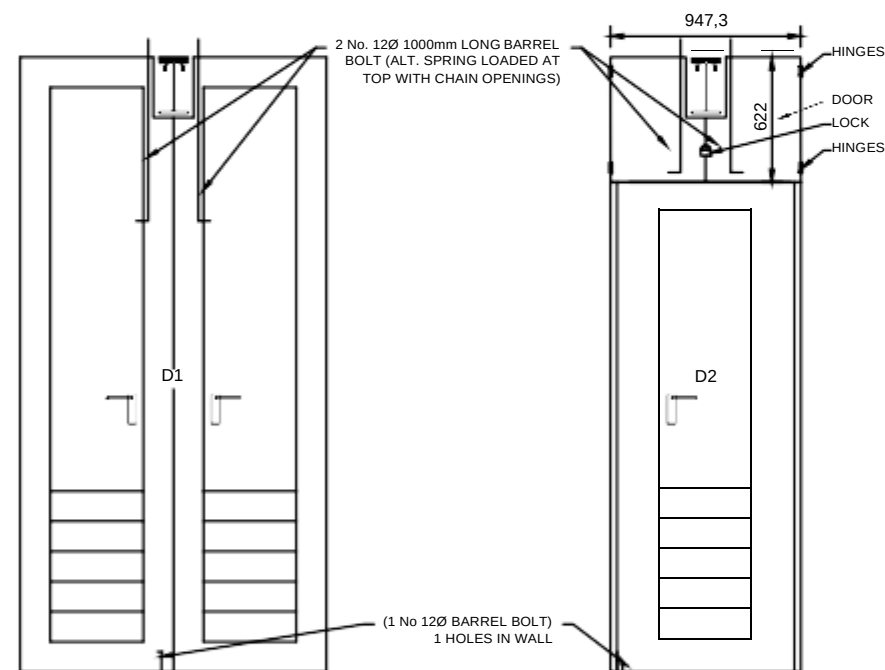


SECTION VIEW
SCALE 1:50

42	9	400	X52	6mm	SPACER PIPE, 6000mm LONG, FLANGE BOTH ENDS. FLANGE TO SANS 1123 TABLE 1600/3		E	E
43	4	300	X52	6mm	SPACER PIPE, 6000mm LONG, FLANGE BOTH ENDS. FLANGE TO SANS 1123 TABLE 1600/3		E	E
44	3	25	STEEL		STOPCOCK, CLASS 16		E	E
45	1	32	STEEL	6mm	PUDDLE PIPE, 380mm LONG, PLAIN ENDED, WITH PUDDLE FLANGE IN THE MIDDLE.		E	E
46	1	25	HDPE		HDPE PIPE 6000mm LONG, CLASS 16 LENGTH CUT TO SUITE ON SITE.			
47	1	25	S/S		S/S GOOSE NECK			
48	2	25	HDPE		PLASSON COMPRESSION FITTINGS MALE ADAPTOR			

GENERAL NOTES:

1. ALL SPECIAL FITTINGS SHALL BE MADE OF STEEL AS SPECIFIED
2. CORROSION PROTECTION
E EPOXY LINING
RPU RIGID POLYURETHANE
3. FLANGE ADAPTORS AND VALVES SHALL BE CLASS 25 UNLESS OTHERWISE SPECIFIED AND SHALL BE EPOXY COATED TO COMPLY WITH THE REQUIREMENTS OF SABS 1217.
4. ALL FLANGES SHALL BE TO SABS 1123 TABLE 1600/3, UNLESS OTHERWISE SPECIFIED.
5. ALL BOLTS AND NUTS SHALL BE GALVANISED STEEL AND SHALL BE TO SABS 1700-5



DETAIL OF DOOR D1

DETAIL OF DOOR D2

DOOR & WINDOW SCHEDULE			
MARK	SIZE	DESCRIPTION	QUANTITY
D1	1525 WIDE x 3060 HIGH	STEEL TRANSFORMER DOUBLE DOOR AND FRAME TYPE YVES (VERMIN PROOFED SINGLE LOUVRE) HEIGHT 3060mm INSTEAD OF STANDARD HEIGHT OF 2440mm. DOOR ALSO TO BE NOTCHED TO SUIT 203x133x30 CRAWL BEAM AND PAINTED TO SPECIFICATION.	5
D2	915 WIDE x 2135HIGH	STANDARD STEEL TRANSFORMER SINGLE DOOR AND FRAME TYPE B (VERMIN PROOFED SINGLE LOUVRE) AND PAINTED TO SPECIFICATIONS.	4
W1	1302 WIDE x 978 HIGH	STANDARD INDUSTRIAL TYPE STEEL WINDOW SS42 HORIZONTAL PIVOT HUNG VENTILATOR INCLUDING 12mmØ M.S. BURGLAR PROOFING ON FULL FACE OF WINDOW, GLAZED AND PAINTED TO SPECIFICATIONS.	7

PIPE AND FITTING SCHEDULE

ITEM No.	No. OFF	PIPE ND mm	MATERIAL	WALL THICKNESS	DESCRIPTION	SKETCH	CORROSION PROTECTION	
							INTERNAL	EXTERNAL
13	2	500	X52	12mm	SPECIAL GUSSET Y-PIECE, FLANGED ONE END, PLAIN ENDED ON THE TWO BRANCH SIDES. FLANGED TO SANS 1123 TABLE 1600/3		E	E
14	2	500/400	X52	12mm	REDUCER, FLANGED ONE SIDE, PLAIN ENDED THE OTHER SIDE. FLANGED TO SANS 1123 TABLE 1600/3		E	E
15	2	500/300	X52	12mm	REDUCER, FLANGED ONE SIDE, PLAIN ENDED THE OTHER SIDE. FLANGED TO SANS 1123 TABLE 1600/3		E	E
16	2	400	X52	12mm	PUDDLE PIPE, 1000mm LONG, FLANGED ONE SIDE, PLAIN ENDED THE OTHER SIDE, WITH PUDDLE FLANGE.		E	E
17	2	300	X52	12mm	PUDDLE PIPE, 1000mm LONG, FLANGED ONE SIDE, PLAIN ENDED THE OTHER SIDE, WITH PUDDLE FLANGE.		E	E
18	4	400	STEEL		WEDGE GATE VALVE, PN 16, FLANGED		E	E
19	4	300	STEEL		WEDGE GATE VALVE, PN 16, FLANGED		E	E
20	2	400	X52	12mm	STEEL PIPE, 1220mm LONG F TO F WITH PRESSURE TESTING POINT 25mm NIPPLE WELDED ON WITH THREADED CUP.		E	E
21	1	300	X52	12mm	STEEL PIPE, 1000 mm LONG F TO F WITH PRESSURE TESTING POINT 25mm NIPPLE WELDED ON WITH THREADED CUP.		E	E
22	2	400	STEEL		PRESSURE REDUCING VALVE, PN16, FLANGED, MODULATED TYPE		E	E
23	2	300	STEEL		PRESSURE REDUCING VALVE, PN16, FLANGED, MODULATED TYPE		E	E
24	2	400	X52	6mm	STEEL PIPE, 850 mm o.a. ONE END 60° FLANGE SPOOL PIECE, 25mm NIPPLE WELDED ON WITH THREADED CAP. FLANGED TO SANS 1123 TABLE 4000/3.		E	E
25	2	300	X52	6mm	STEEL PIPE, 730 mm LONG F TO F WITH PRESSURE TESTING POINT 25mm NIPPLE WELDED ON WITH		E	E
26	2	400	X52		PIPE SECTION FLANGED ONE END, (300mm o.a LONG) 60° FLANGE SPOOL PIECE OTHER END, DRILLED TO TABLE 4000 SANS 1123.		E	E
27	2	300	X52		PIPE SECTION FLANGED ONE END, (268mm o.a LONG) 60° FLANGE SPOOL PIECE OTHER END, DRILLED TO TABLE 4000 SANS 1123.		E	E
28	2	400	STEEL		LEVEL CONTROL VALVE, PN16, FLANGE TO SANS 1123 TABLE 1600/3		E	E
29	2	300	STEEL		LEVEL CONTROL VALVE, PN16, FLANGE TO SANS 1123 TABLE 1600/3		E	E
30	4	400	X52	6mm	SPACER PIPE, 450mm LONG, BOTH ENDS FLANGED. FLANGE TO SANS 1123 TABLE 1600/3		E	E
31	4	300	X52	6mm	SPACER PIPE, 450 mm LONG, BOTH ENDS FLANGED. FLANGE TO SANS 1123 TABLE 1600/3		E	E
32	2	400	X52		ORIFICE PLATE, S/S		-	-
33	2	300	X52		ORIFICE PLATE, S/S		-	-
34	2	400	X52	6mm	PUDDLE PIPE, 1000mm LONG, FLANGED BOTH ENDS, WITH PUDDLE FLANGE. FLANGE TO SANS 1123 TABLE 1600/3		E	E
35	1	400	X52	6mm	SPACER PIPE, 744mm LONG, FLANGE BOTH ENDS. FLANGE TO SANS 1123 TABLE 1600/3		E	RPU
36	2	300	X52	6mm	PUDDLE PIPE, 2100 mm LONG, FLANGED BOTH SIDES, WITH PUDDLE FLANGE IN THE MIDDLE. FLANGE TO SANS 1123 TABLE 1600/3		E	E
37	2	400	X52	6mm	90° GUSSET LONG RADIUS BEND, PLAIN ENDS. FLANGE BOTH ENDS. FLANGE TO SANS 1123 TABLE 1600/3		E	E
38	2	300/400	X52	6mm	REDUCER FLANGE BOTH ENDS. FLANGE TO SANS 1123 TABLE 1600/3		E	E
39	1	400	X52	6mm	SPACER PIPE, 1500mm LONG, PLAIN ENDED. CORRECT LENGTH TO BE DETERMINED ON SITE.		E	RPU
40	1	400	X52	6mm	SPACER PIPE, 3500mm LONG, FLANGE BOTH ENDS. FLANGE TO SANS 1123 TABLE 1600/3		E	RPU
41	2	400	X52	6mm	SPACER PIPE, 2500mm LONG, FLANGE BOTH ENDS. FLANGE TO SANS 1123 TABLE 1600/3		E	RPU



MARISWE (Pty) Ltd
P.O.Box 25549
Monument Park
0105

TEL: +27 (0) 12 424 9700

DESIGNED	W.K	06.06.2016
DRAWN	W.K	06.06.2016
CHECKED	K.G	14/02/2019
APPROVED BY: K.GOVENDER		09/07/2024
ECSA REG. No.	201470227	DATE
CHECKED		
APPROVED BY: E.MUDAU		
	SIGNATURE	DATE
ECSA REG. No		



TURBINE HALL
65 NTEMI PILISO STREET
NEWTOWN
2113

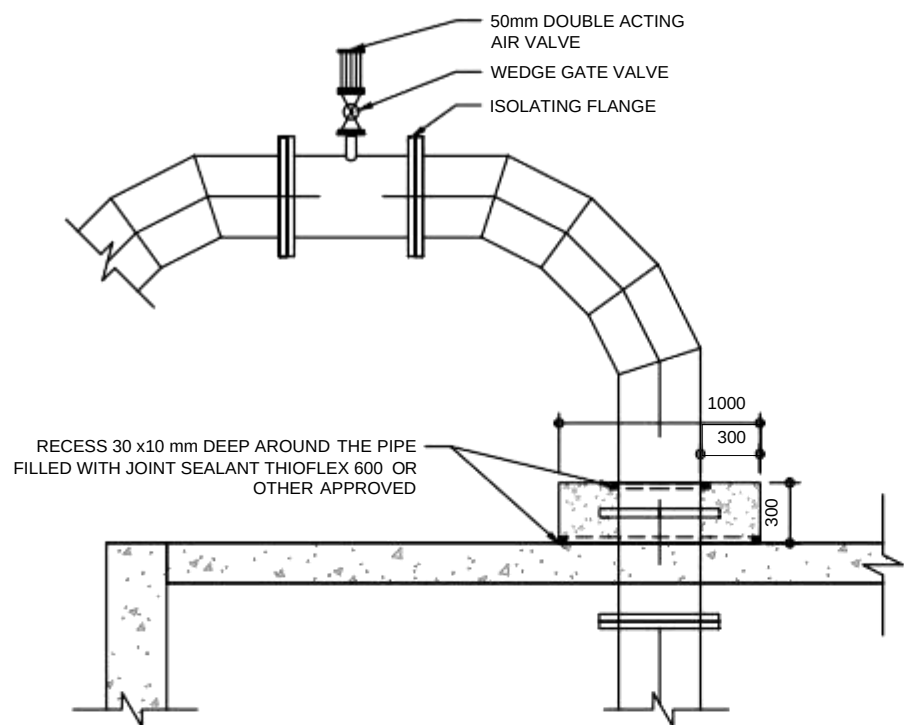
TEL: (011) 688-1542
FAX: (011) 688-6604

Joburg

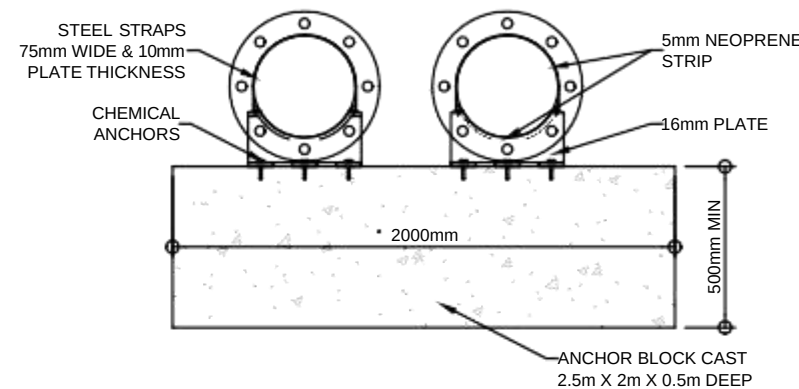
JW14301R: LINBRO WATER UPGRADES

RESERVOIR CONTROL VALVE PIPE SCHEDULE AT LINBRO PARK & ALEXANDRA RESERVOIR COMPLEX

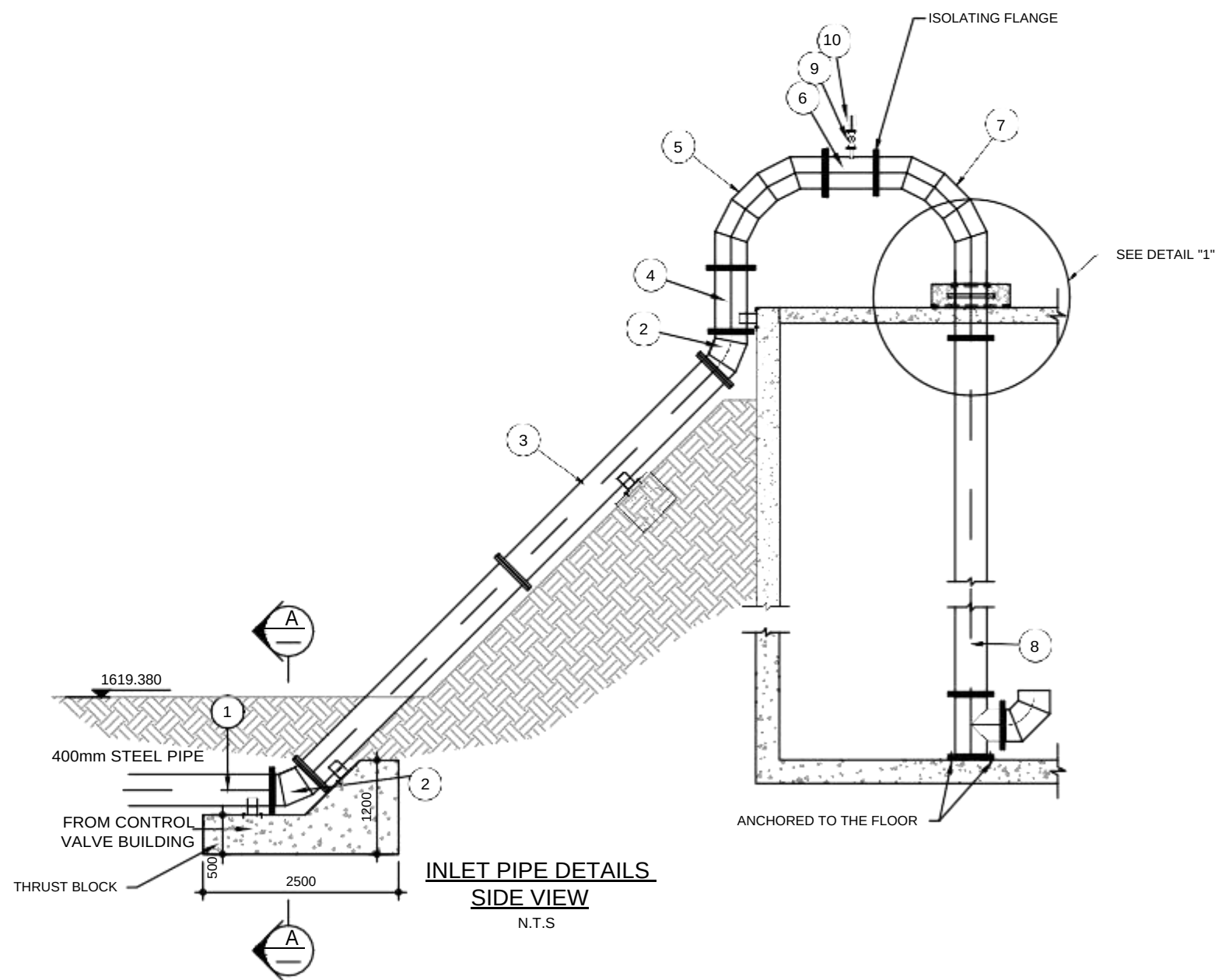
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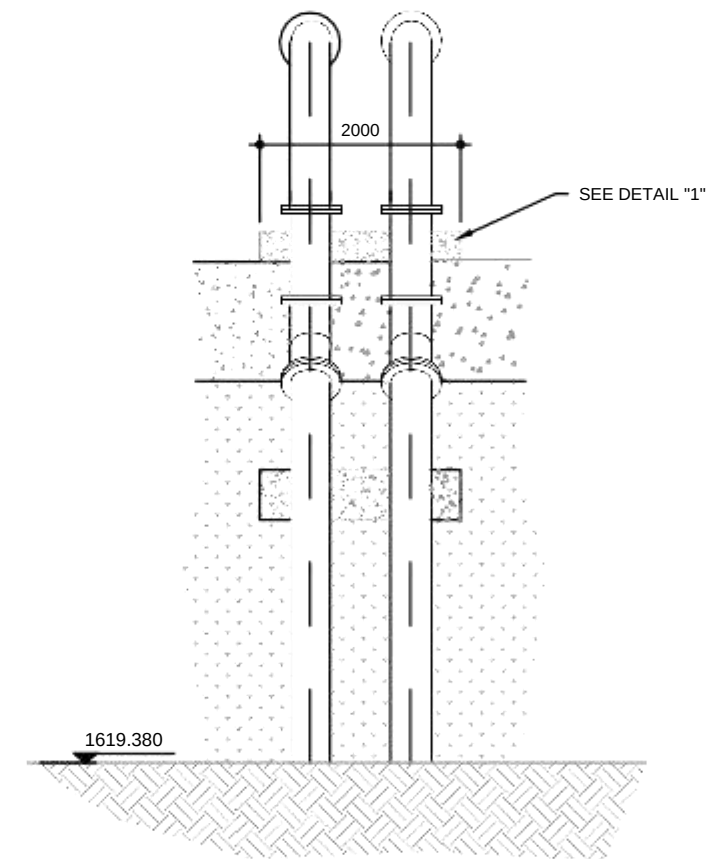
DETAIL "1"
SCALE 1:25



SECTION A-A
PIPE ANCHOR DETAIL
N.T.S



INLET PIPE DETAILS
SIDE VIEW
N.T.S



INLET PIPE DETAILS
FRONT VIEW
N.T.S

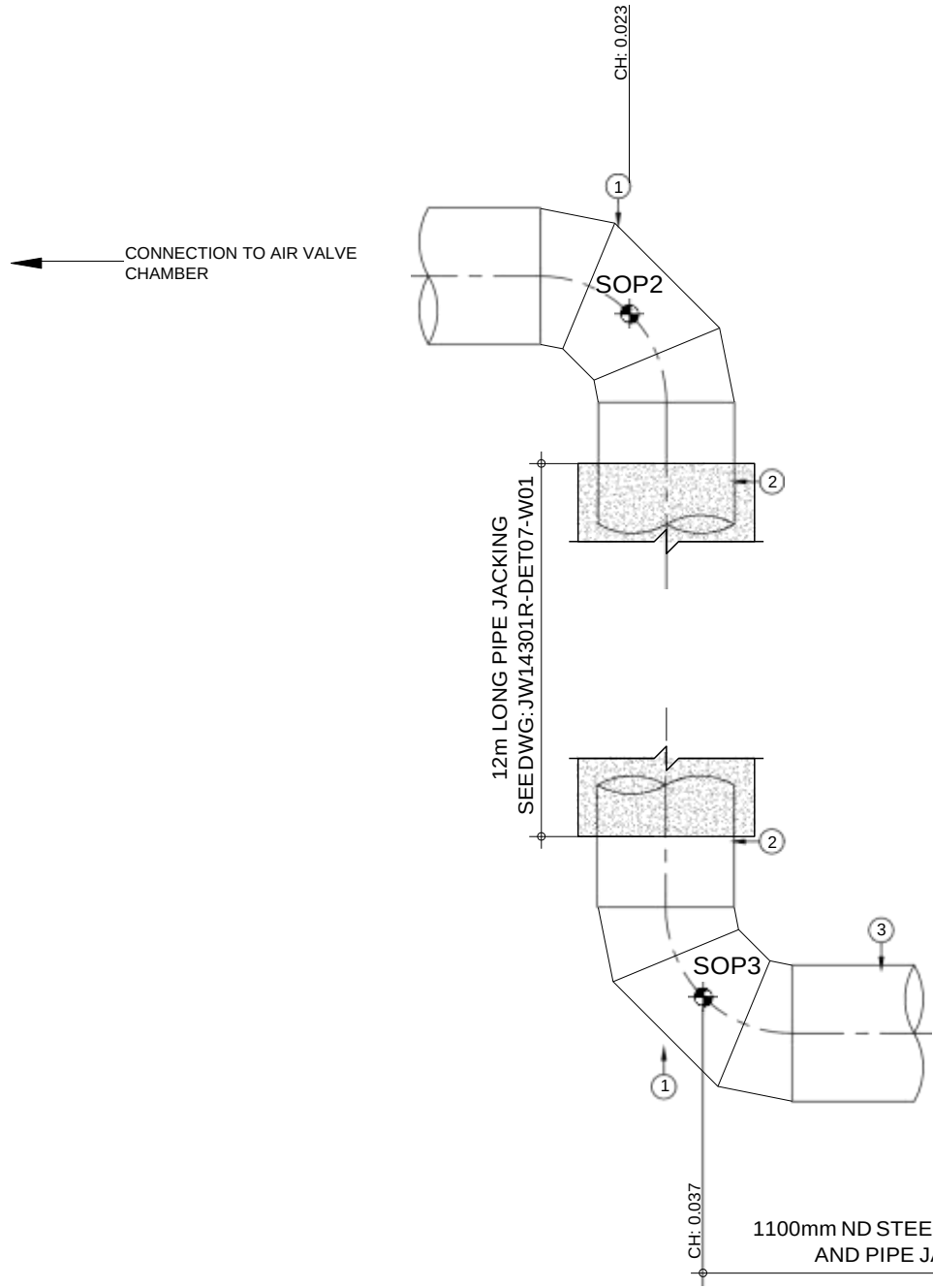
PIPE AND FITTING SCHEDULE								
ITEM No.	No. OFF	VALVE ND 400mm	MATERIAL	WALL THICKNESS	DESCRIPTION	SKETCH	CORROSION PROTECTION	
							INTERNAL	EXTERNAL
1	2	400	X52	6mm	PIPE SECTION 1050mm LONG, BOTH ENDS FLANGED TO SANS 1123 TABLE 1600/3.		E	RPU
2	4	400	X52	6mm	45° LONG RADIUS GUSSET BEND, FLANGED BOTH ENDS, FLANGED TO SANS 1123 TABLE 1600/3		E	E
3	4	400	X52	6mm	DISTANCE PIECE 3400mm OR TO SUIT, FLANGED BOTH ENDS, FLANGED TO SANS 1123 TABLE 1600/3		E	E
4	2	400	X52	6mm	DISTANCE PIECE 814mm LONG, FLANGED BOTH ENDS, FLANGED TO SANS 1123 TABLE 1600/3		E	E
5	2	400	X52	6mm	90° LONG RADIUS GUSSET BEND, FLANGED BOTH ENDS, FLANGED TO SANS 1123 TABLE 1600/3		E	RPU
6	2	400/50	X52	6mm	REDUCING T-PIECE FLANGED ALL SIDES, FLANGED TO SANS 1123 TABLE 1600/3		E	E
7	2	400	S/S	6mm	GOOSE NECK PIECE 2115mm LONG, FLANGED BOTH ENDS, WITH PUDDLE FLANGE 540mm FROM OUTER END, FLANGED TO SANS 1123 TABLE 1600/3			
8	2	400	S/S	6mm	OUTLET DIFFUSER PIPE WITH A T-PIECE AND BEND ON THE BRANCH LENGTH OF 7000mm o.a. FLANGED TO SANS 1123 TABLE 1600/3			
9	2	50	STEEL	-	WEDGE GATE VALVE, FLANGED, PN16		E	E
10	2	50	STEEL	-	DOUBLE ACTION AIR VALVE, FLANGED		E	E
NOTE : QUANTITIES ARE FOR 2 No. INLETS FOR GUSSET BENDS - SEE DWG: JW14301R-DET08								

ISSUE FOR TENDER ONLY

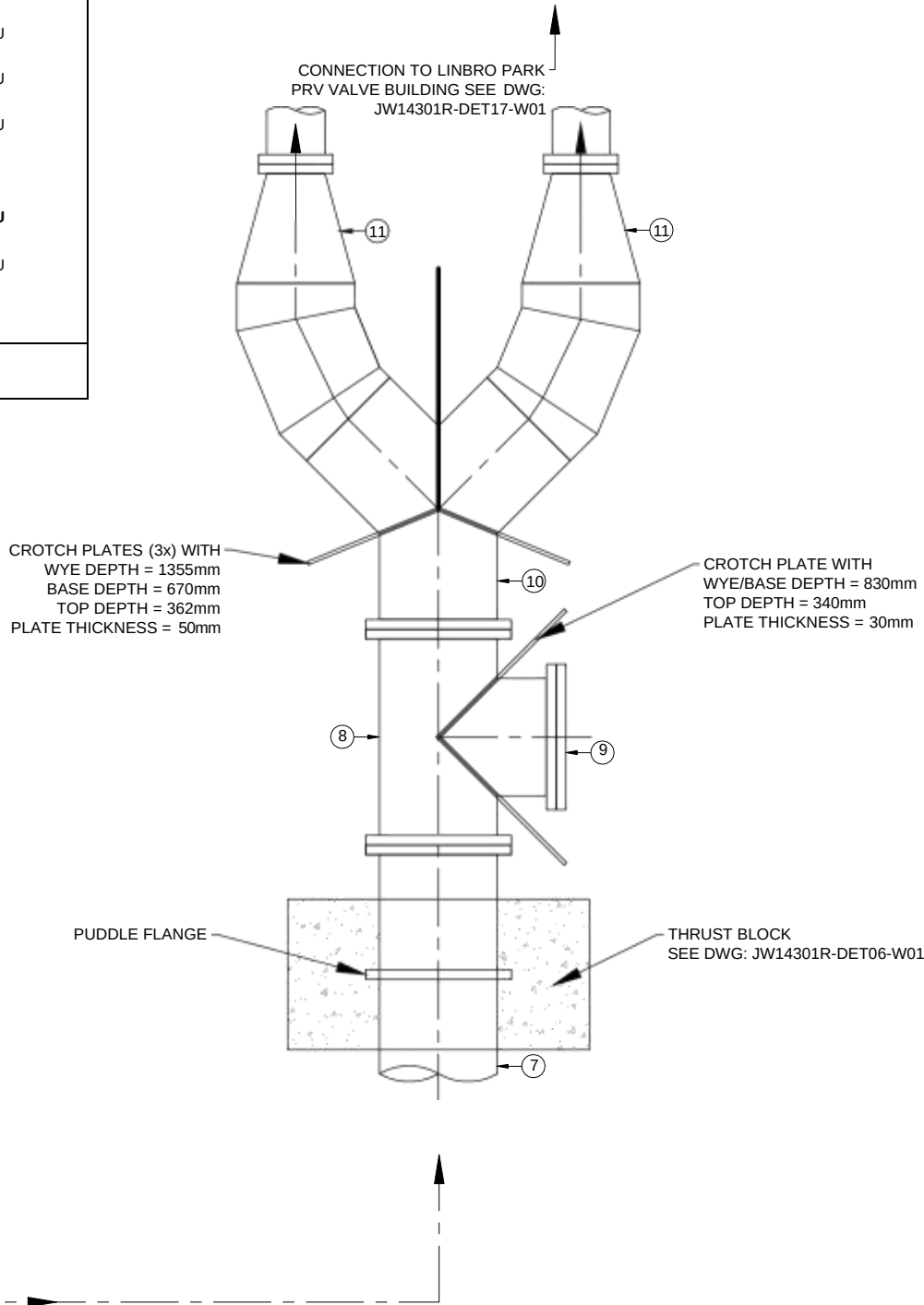
SETTING OUT DATA		
NAME	Y	X
SOP2	87329.075	2888648.677
SOP3	87328.265	2888663.621
SOP4	86701.470	2888630.689

ITEM	No OFF.	DIA (mm)	DESCRIPTION	WALL THICKNESS	MATERIAL	CORROSION PROTECTION	
						INTERNAL	EXTERNAL
1	2	1100	90° GUSSET STEEL BENDS	12	API 5L X52	E	RPU
2	1	1100	STEEL PIPE JACKING 20m LONG	12	API 5L X52	E	RPU
3	1	1100	STEEL PIPELINE SECTION 1	12	API 5L X52	E	RPU
4	1	1100	EQUAL T-PIECE WITH CROTCH PLATES, ONE END FLANGED, OTHER ENDS WELDED.	12	API 5L X52	E	RPU
5	1	1100	BLANK FLANGE FOR FUTURE CONNECTION	12	API 5L X52	E	E
6	1	1100 x 1000	REDUCER, F TO F 705mm LONG, WELDED BOTH ENDS.	12	API 5L X52	E	RPU
7	1	1000	STEEL PIPELINE SECTION 2 WITH PUDDLE FLANGE, PLAIN ENDED	12	API 5L X52	E	RPU
8	2	1000	EQUAL T-PIECE WITH CROTCH PLATES, ALL ENDS FLANGED	12	API 5L X52	E	RPU
9	1	1000	BLANK FLANGE FOR FUTURE CONNECTION	12	API 5L X52	E	E
10	1	1000	SPECIAL GUSSET Y-PIECE WITH CROTCH PLATES, ONE END FLANGED	12	API 5L X52	E	RPU
11	2	1000 x 500	REDUCER PIECE, FLANGED ONE END	12	API 5L X52	E	RPU

NOTE: ALL PIPE FITTINGS TO BE WELDED UNLESS OTHERWISE SPECIFIED.



PLAN VIEW
SCALE 1:40

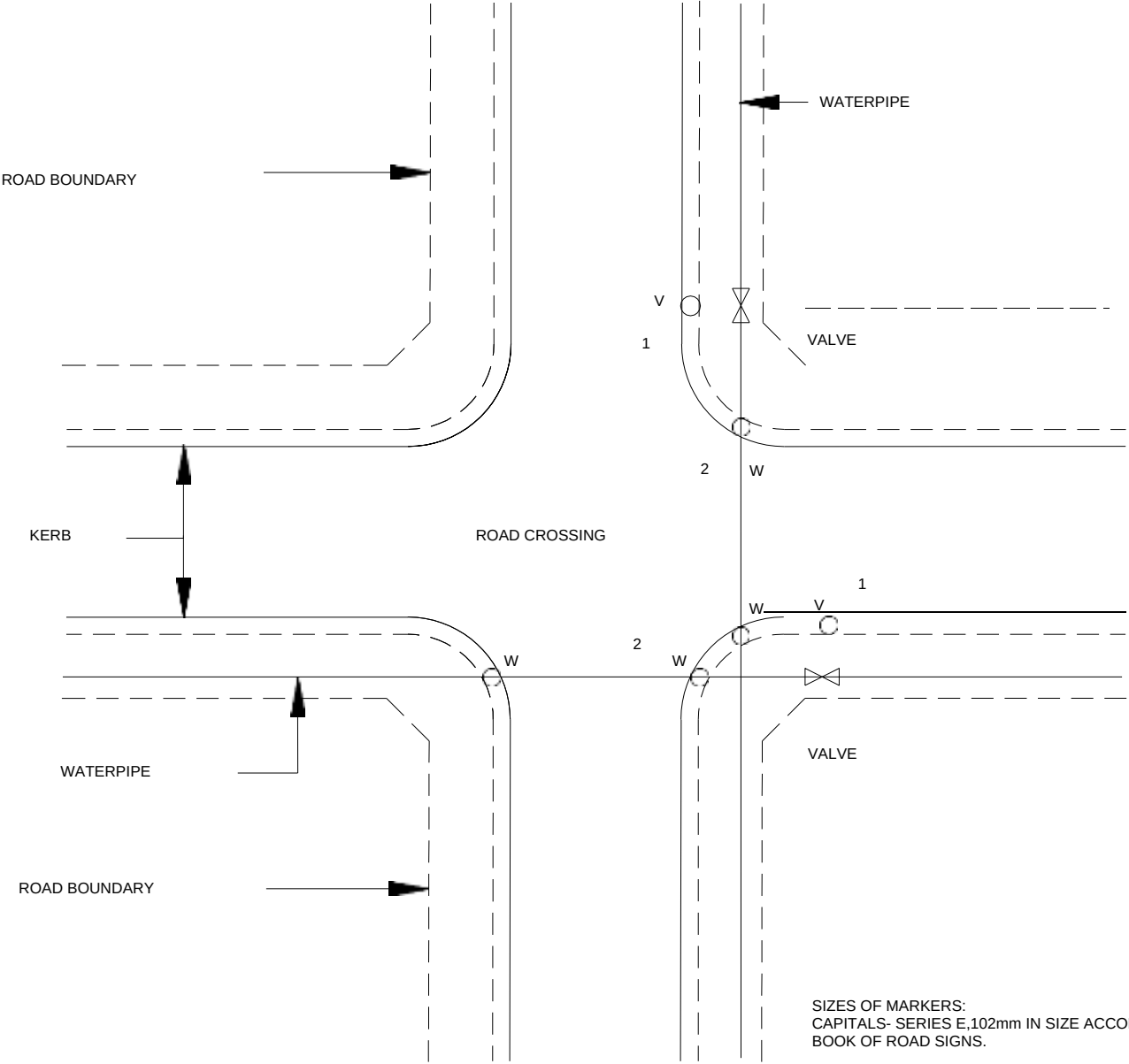


GENERAL NOTES:

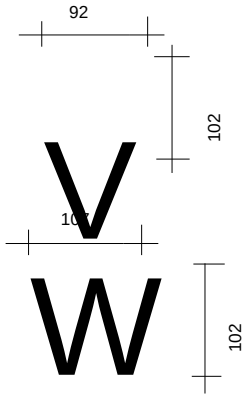
- ALL SPECIAL FITTINGS SHALL BE MADE OF STEEL AS SPECIFIED
- CORROSION PROTECTION
E EPOXY LINING / COATING
RPU RIGIDPOLYURETHANE
- FLANGE ADAPTORS AND VALVES SHALL BE CLASS 40 OR AS SPECIFIED, AND SHALL BE EPOXY COATED TO COMPLY WITH THE REQUIREMENTS OF SABS 1217.
- ALL FLANGES SHALL BE TO SABS 1123 TABLE 4000, OR AS SPECIFIED.
- ALL BOLTS AND NUTS SHALL BE GALVANISED STEEL AND SHALL BE TO SABS 1700-5

ISSUE FOR TENDER ONLY

 MARISWE (Pty) Ltd P.O.Box 25549 Monument Park 0105 TEL: +27 (0) 12 424 9700	DESIGNED W.K. 28/05/2014	 Johannesburg Water	TURBINE HALL 65 NTEMI PILISO STREET NEWTOWN 2113 TEL: (011) 688-1542 FAX: (011) 688-6604	 JW14301R: LINBRO WATER UPGRADES NODE AND JUNCTION DETAILS	SCALE 1:40	REV: T	AMENDMENTS ISSUE FOR TENDER	APPROVED DATE: 12/07/2024	DRAWING No: JW14301R-DET22-W01 PROJECT No: JW14301R DRAWING No: DET22 REV: T SHEET 1 OF 1 ORIGINAL PAGE SIZE FILE No.
	DRAWN W.K. 28/05/2014				CHECKED K.G. 14/02/2019	APPROVED BY: K.GOVENDER 09/07/2024 SIGNATURE DATE	ECSA REG. No. 201470227	CHECKED	



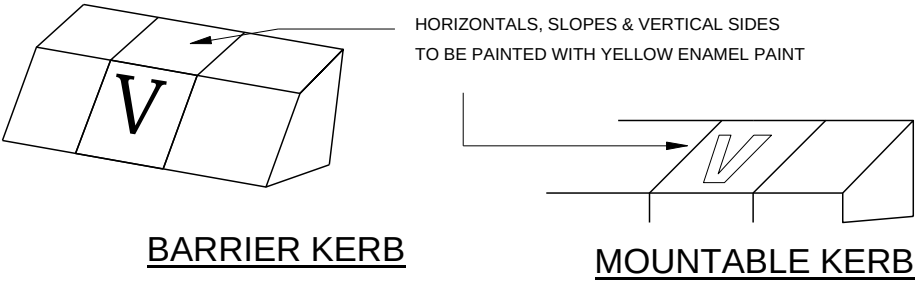
SIZES OF MARKERS:
CAPITALS- SERIES E,102mm IN SIZE ACCORDING TO THE S.A.
BOOK OF ROAD SIGNS.



NOTE

1) TOP SURFACE OF COVERS
TO BE PAINTED AS FOLLOWS:
VALVES NORMALLY OPEN : BLUE
VALVES NORMALLY CLOSED : SIGNAL RED
SCOUR VALVES : GREEN

AIR VALVES : BROWN



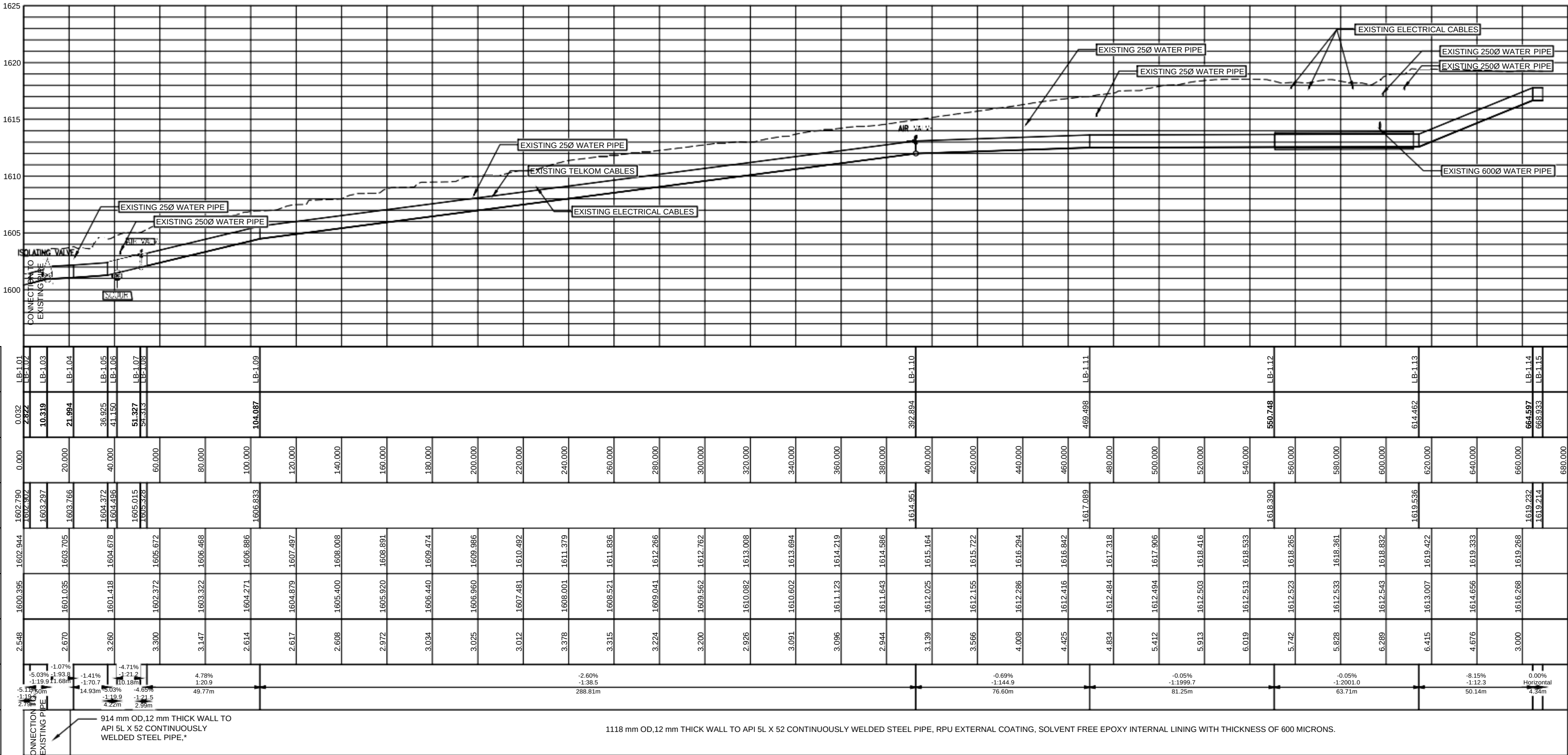
DETAILS OF SERVICE MARKERS

 MARISWE PROJECTS (PTY) LTD MARISWE (Pty) Ltd P.O.Box 25549 Monument Park 0105 TEL: +27 (0) 12 424 9700	DESIGNED	W.K	19.05.2014	 Johannesburg Water	TURBINE HALL 65 NTEMI PILISO STREET NEWTOWN 2113 TEL: (011) 688-1542 FAX: (011) 688-6604	JW14301R: LINBRO WATER UPGRADES PIPE MARKERS	SCALE	REV:	AMENDMENTS	APPROVED DATE:	DRAWING-No. JW14301R-DET23-W01 JW14301R PROJECT No. DET23 DRAWING No. T REV. A1 SHEET 1 OF 1 ORIGINAL PAGE SIZE FILE No.

SCALES:
Horizontal 1:1000
Vertical 1:200

DATUM 1595.000

REFERENCE
DISTANCE AT NODES (m)
DISTANCE AT INTERVALS (m)
GROUND LEVEL AT NODES
GROUND LEVELS (INTERVAL)
PIPE BED LEVEL
DEPTH TO PIPE BED LEVEL
SLOPE / LENGTH
PIPE SPECIFICATION



LONGSECTION SECTION 1
FROM 0.000 TO 680.000

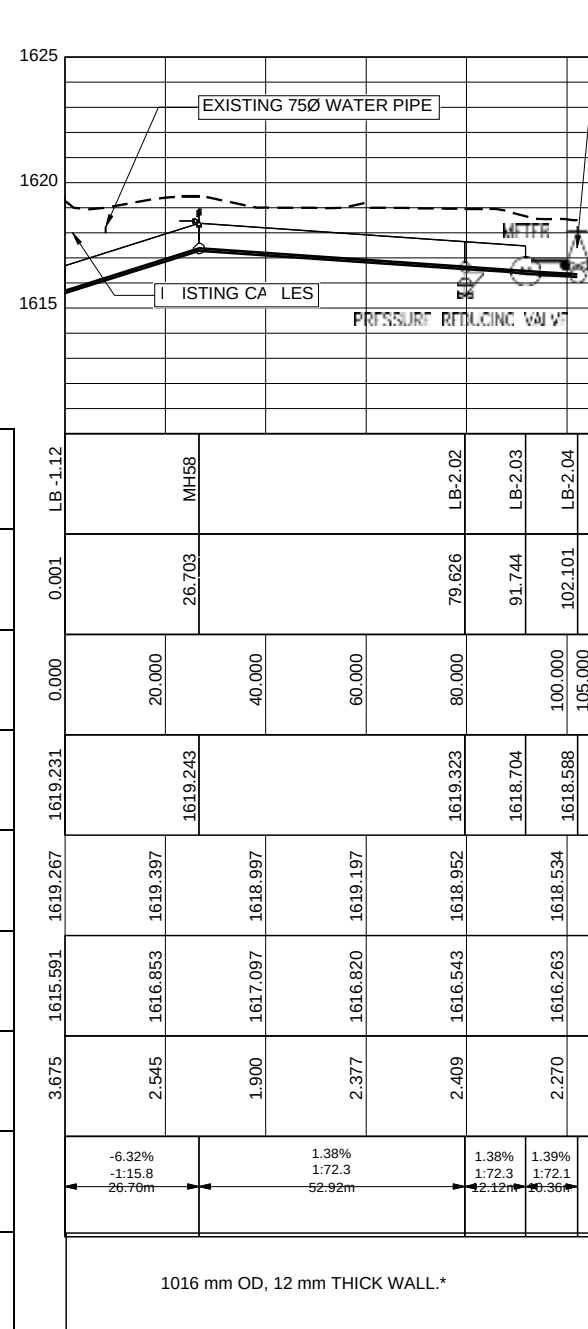
FOR SECTION DESCRIPTIONS, SEE TABLE ON DRAWINGS JW13899-DET03-W01

ISSUE FOR TENDER ONLY

 MARISWE (Pty) Ltd P.O.Box 25549 Monument Park 0105 TEL: +27 (0) 12 424 9700	DESIGNED C.F. 16.04.2015	 Johannesburg Water	TURBINE HALL 65 NTEMI PILISO STREET NEWTOWN 2113 TEL: (011) 688-1542 FAX: (011) 688-6604	 JW14301R: LINBRO WATER UPGRADES LONGSECTION SECTION 1	SCALE N.T.S.	REV: T	AMENDMENTS ISSUE FOR TENDER	APPROVED DATE: 12/07/2024	DRAWING No: JW14301R-DET25-W01
	CHECKED K.G. 14/02/2019				APPROVED BY: K.GOVENDER 09/07/2024	ECSA REG. No. 201470227	CHECKED	APPROVED BY: E.MUDAU	ECSA REG. No.
SHEET 1 OF 1									

DATUM 1610.000

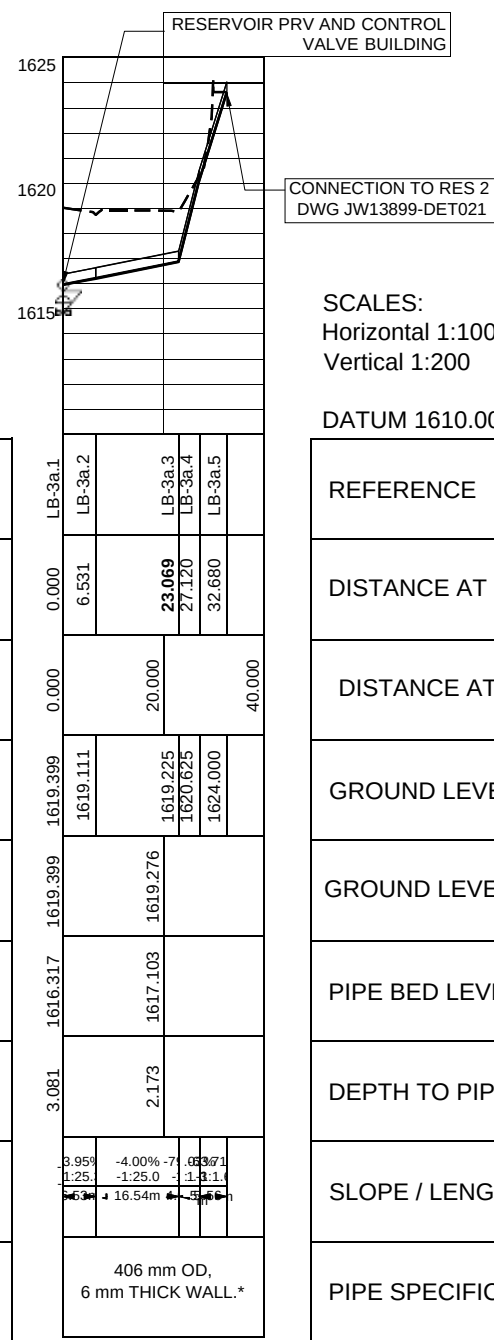
REFERENCE
DISTANCE AT NODES (m)
DISTANCE AT INTERVALS (m)
GROUND LEVEL AT NODES
GROUND LEVELS (INTERVAL)
PIPE BED LEVEL
DEPTH TO PIPE BED LEVEL
SLOPE / LENGTH
PIPE SPECIFICATION



LONGSECTION SECTION 2
FROM 0.000 TO 105.000

DATUM 1610.000

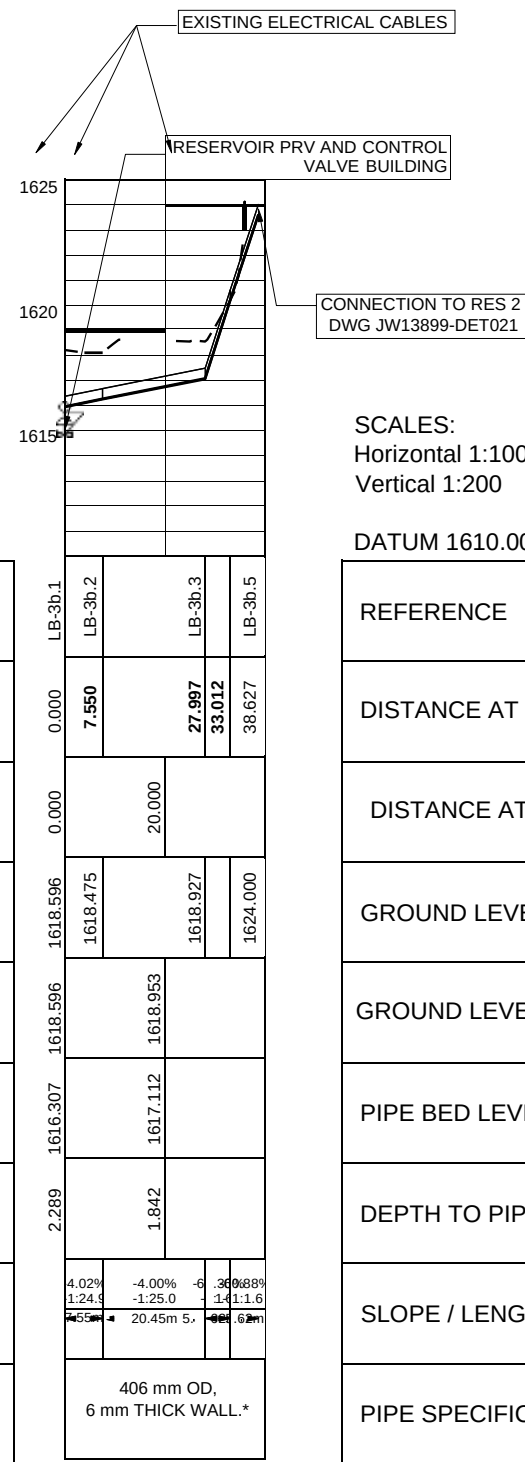
REFERENCE
DISTANCE AT NODES (m)
DISTANCE AT INTERVALS (m)
GROUND LEVEL AT NODES
GROUND LEVELS (INTERVAL)
PIPE BED LEVEL
DEPTH TO PIPE BED LEVEL
SLOPE / LENGTH
PIPE SPECIFICATION



LONGSECTION SECTION-3A
FROM 0.000 TO 40.000

DATUM 1610.000

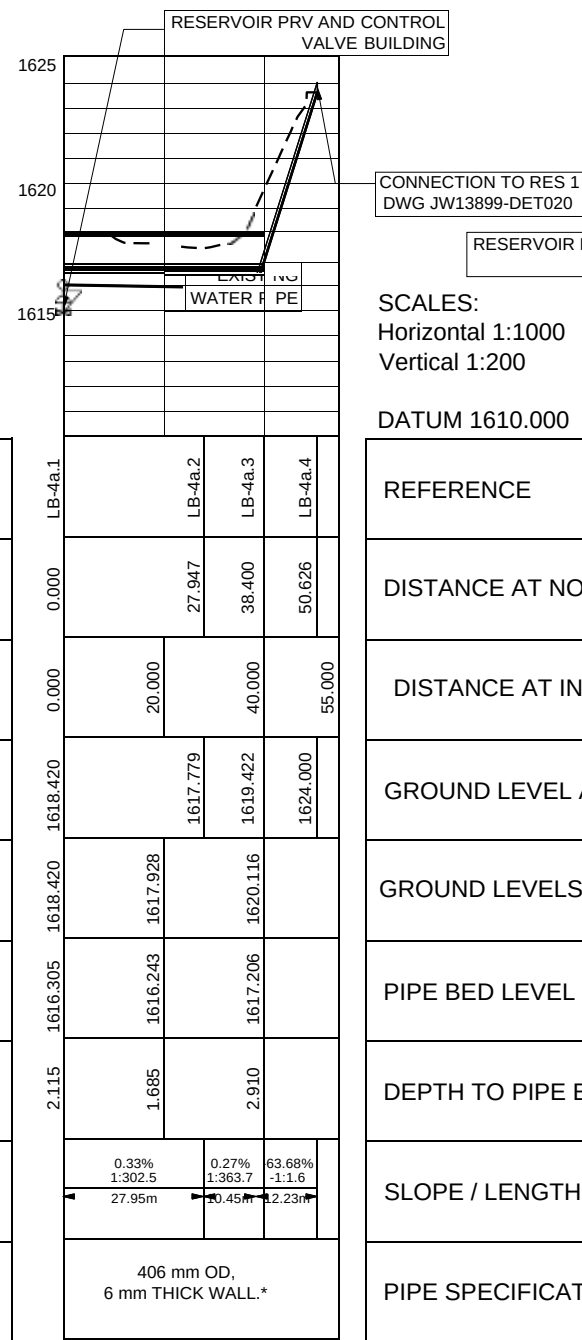
REFERENCE
DISTANCE AT NODES (m)
DISTANCE AT INTERVALS (m)
GROUND LEVEL AT NODES
GROUND LEVELS (INTERVAL)
PIPE BED LEVEL
DEPTH TO PIPE BED LEVEL
SLOPE / LENGTH
PIPE SPECIFICATION



LONGSECTION SECTION-3B
FROM 0.000 TO 40.000

DATUM 1610.000

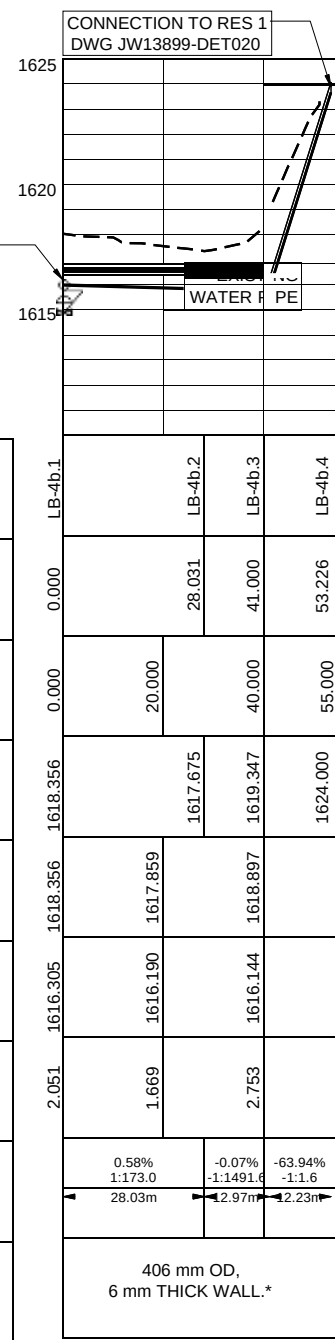
REFERENCE
DISTANCE AT NODES (m)
DISTANCE AT INTERVALS (m)
GROUND LEVEL AT NODES
GROUND LEVELS (INTERVAL)
PIPE BED LEVEL
DEPTH TO PIPE BED LEVEL
SLOPE / LENGTH
PIPE SPECIFICATION



LONGSECTION SECTION-4A
FROM 0.000 TO 55.000

DATUM 1610.000

REFERENCE
DISTANCE AT NODES (m)
DISTANCE AT INTERVALS (m)
GROUND LEVEL AT NODES
GROUND LEVELS (INTERVAL)
PIPE BED LEVEL
DEPTH TO PIPE BED LEVEL
SLOPE / LENGTH
PIPE SPECIFICATION



LONGSECTION SECTION-4B
FROM 0.000 TO 55.000

FOR SECTION DESCRIPTIONS, SEE TABLE ON DRAWINGS JW13572-DET03-W01

 MARISWE ENGINEERING CONSULTING MARISWE (Pty) Ltd P.O.Box 25549 Monument Park 0105 TEL: +27 (0) 12 424 9700	DESIGNED	C.F.	16.04.2015
	DRAWN	E.E	16.04.2015
	CHECKED	K.G	14/02/2019
	APPROVED BY: K.GOVENDER		09/07/2024
	SIGNATURE		DATE
	ECSA REG. No.	201470227	
	CHECKED		
	APPROVED BY: E.MUDAU		
	SIGNATURE		DATE
	ECSA REG. No.		



TEL: (011) 688-1542
FAX: (011) 688-6604

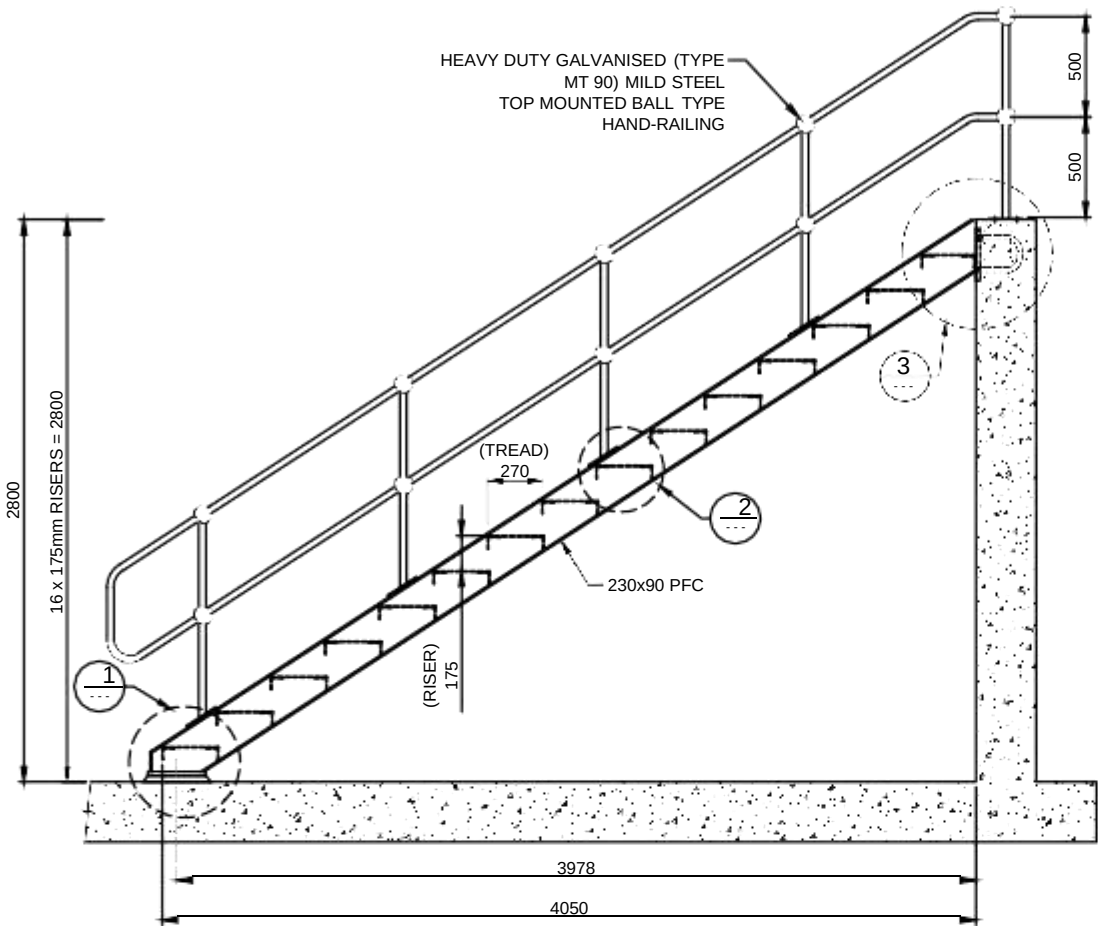


LONGSECTION SECTION 2 TO SECTION 4b

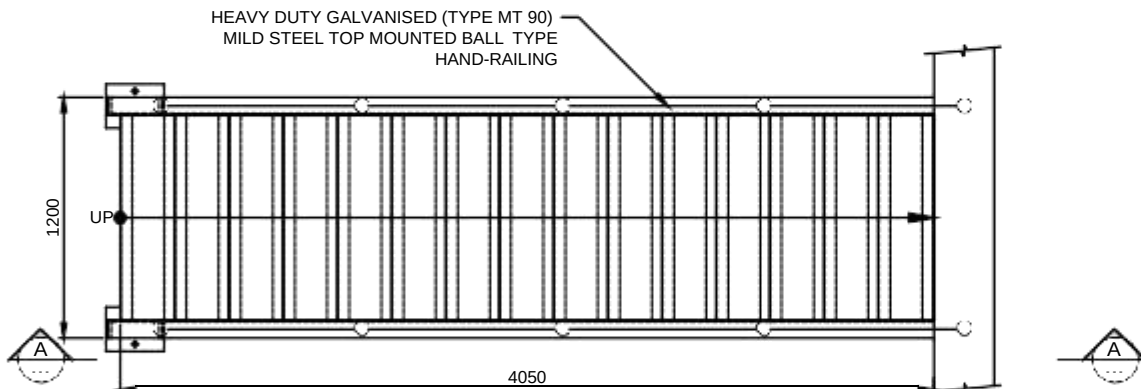
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STEEL NOTES:

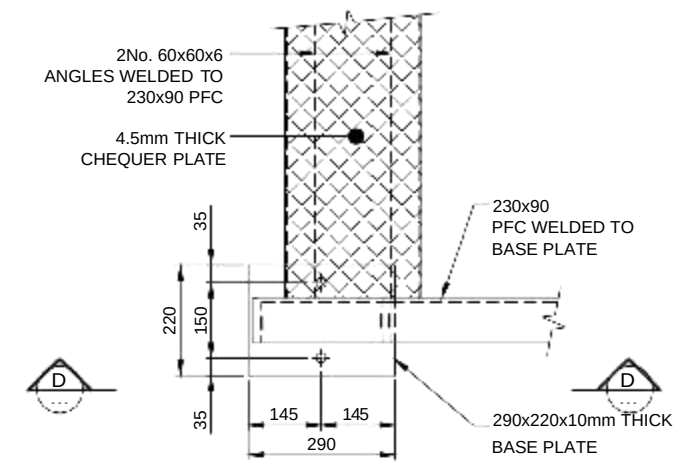
1. THE QUALITY OF WORK AND MATERIALS TO COMPLY WITH SABS 0162. "THE STRUCTURAL USE OF STEEL" AND SABS 1200H "STANDARDIZED SPECIFICATIONS FOR CIVIL ENGINEERING TENDER CHAPTER 4 STRUCTURAL STEELWORK.
2. ALL STRUCTURAL STEEL TO BE GRADE 350W UNLESS COLD FORMED.
3. MINIMUM YIELD STRESS OF 200Mpa AND TENSILE STRENGTH OF 365Mpa MUST BE USED FOR COLD FORMED STEEL.
4. REMOVE ALL OIL, GREASE AND SOLUBLE SALTS BY WASHING WITH A WATER EMULSIFIABLE SOLVENT DEGREASER AND RINSING WITH POTABLE WATER. DRY ABRASIVE BALST TO NEAR WHITE METAL IN ACCORDANCE WITH SA2.5 OF THE INTERNATIONAL STANDARD. ISO 8501-1: 1998 TO OBTAIN A SURFACE PROFILE OF 40 TO 80 MICRONS.
5. ALL STEELWORK TO BE HOT-DIP GALVANISED.
6. THE CONTRACTOR SHALL SATISFY HIMSELF THAT THE ENGINEER'S DRAWINGS CONTAIN ALL THE INFORMATION REQUIRED FOR THE PREPARATION OF SHOP DRAWINGS AS SOON AS POSSIBLE.
7. CONTRACTOR TO SUPPLY TWO SETS OF SHOP DRAWINGS TOGETHER WITH SUPPORTING CALCULATIONS TO ENGINEER FOR APPROVAL BEFORE COMMENCING WITH FABRICATION.
8. ALL BOLTS TO BE GRADE 8.8 UNLESS OTHERWISE SPECIFIED.
9. ALL WELDING TO SABS 044.
10. ALL WELDS TO BE 6mm FILLET WELDS TO GRADE E70XX UNLESS OTHERWISE NOTED.
11. WELDS TO BE CONTINUOUS ROUND ALL INTERSECTIONS.
12. ALL CONNECTIONS NOT DETAILED SHALL BE WELDED TO FULL STRENGTH USING GRADE E70XX ELECTRODES.
13. QUALITY CONTROL ON WELDS SHALL BE AS FOLLOWS:
1. ALL WELDS TO BE INSPECTED USING VISUAL AIDS
2. BUTT WELDS: 100% ULTRASONIC NDT
3. FILLET WELDS: 20% MPI
4. CRANE/CRAWL BEAMS: 100% ULTRASONIC NDT
14. FABRICATION AND ERECTION TO BE DONE TO SABS 1200.
15. ALL STRUCTURAL STEEL BELOW GROUND LEVEL, CAST INTO CONCRETE, SHALL BE PAINTED WITH TWO COATS OF BITUMEN BEFORE BACKFILLING OR BRICKING UP.
16. ALL STRUCTURAL STEEL MUST BE FREE OF RUST, OIL, SLAG AND DIRT AND MUST BE PAINTED WITH AT LEAST THE PRIMER COAT DIRECTLY AFTER MANUFACTURING. FOR CLEANING OF STEEL, SEE NOTE ABOVE.
17. IF MANUFACTURED STRUCTURAL STEELWORK HAS TO BE STORED, MEASURES SHOULD BE TAKEN TO AVOID RUSTING. NO RUSTED STEEL MAY BE ERECTED.



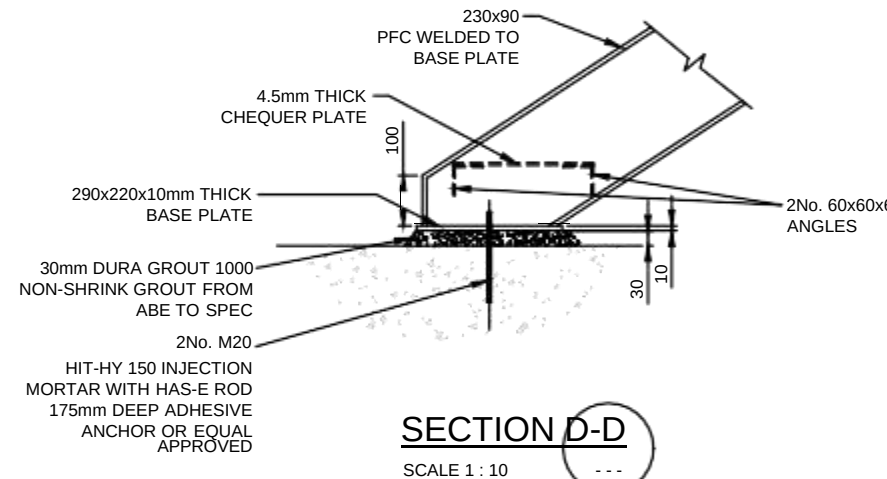
ELEVATION A-A
SCALE 1 : 25



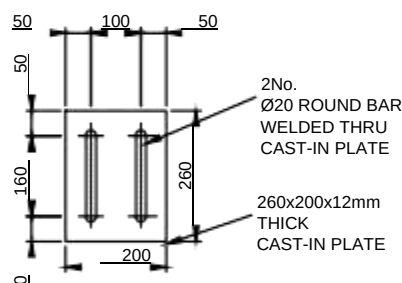
STAIRCASE PLAN LAYOUT
SCALE 1 : 25



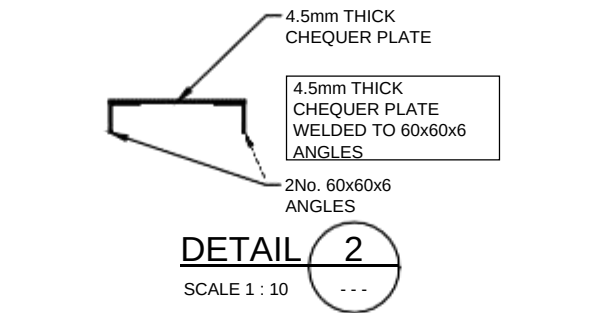
DETAIL 1:
BASE PLATE DIMENSIONS
SCALE 1 : 10



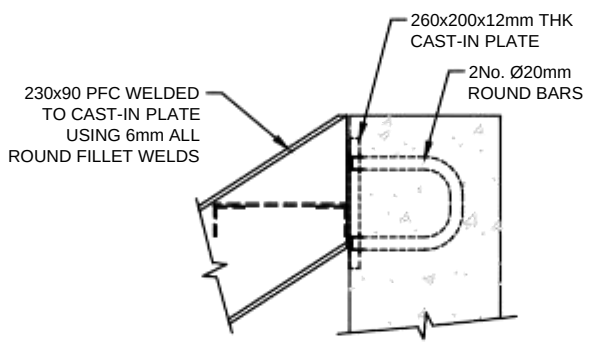
SECTION D-D
SCALE 1 : 10



ELEVATION ON CAST-IN PLATE
2No. REQUIRED PER STAIRCASE
SCALE 1 : 10



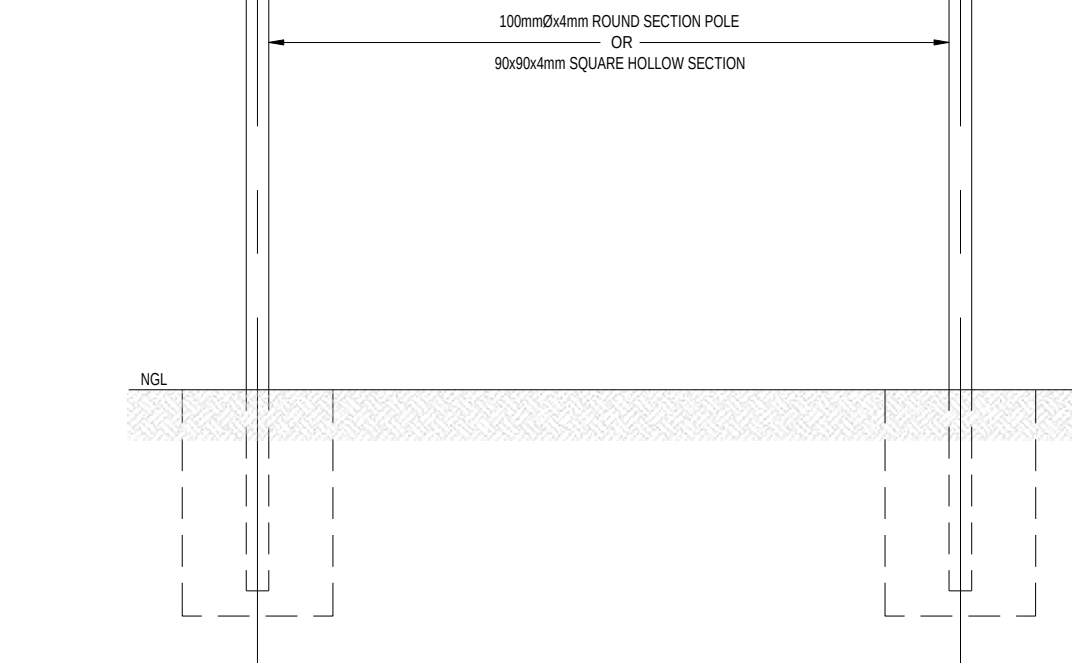
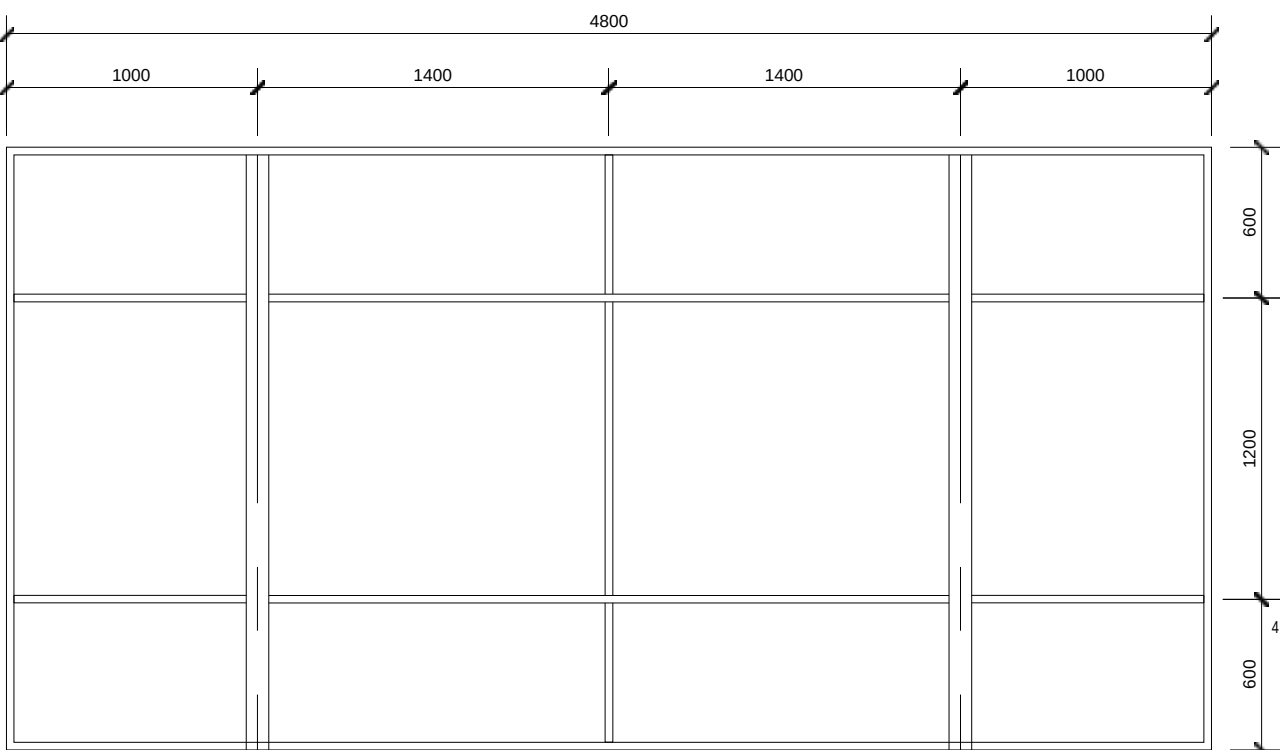
DETAIL 2
SCALE 1 : 10



DETAIL 3
SCALE 1 : 10

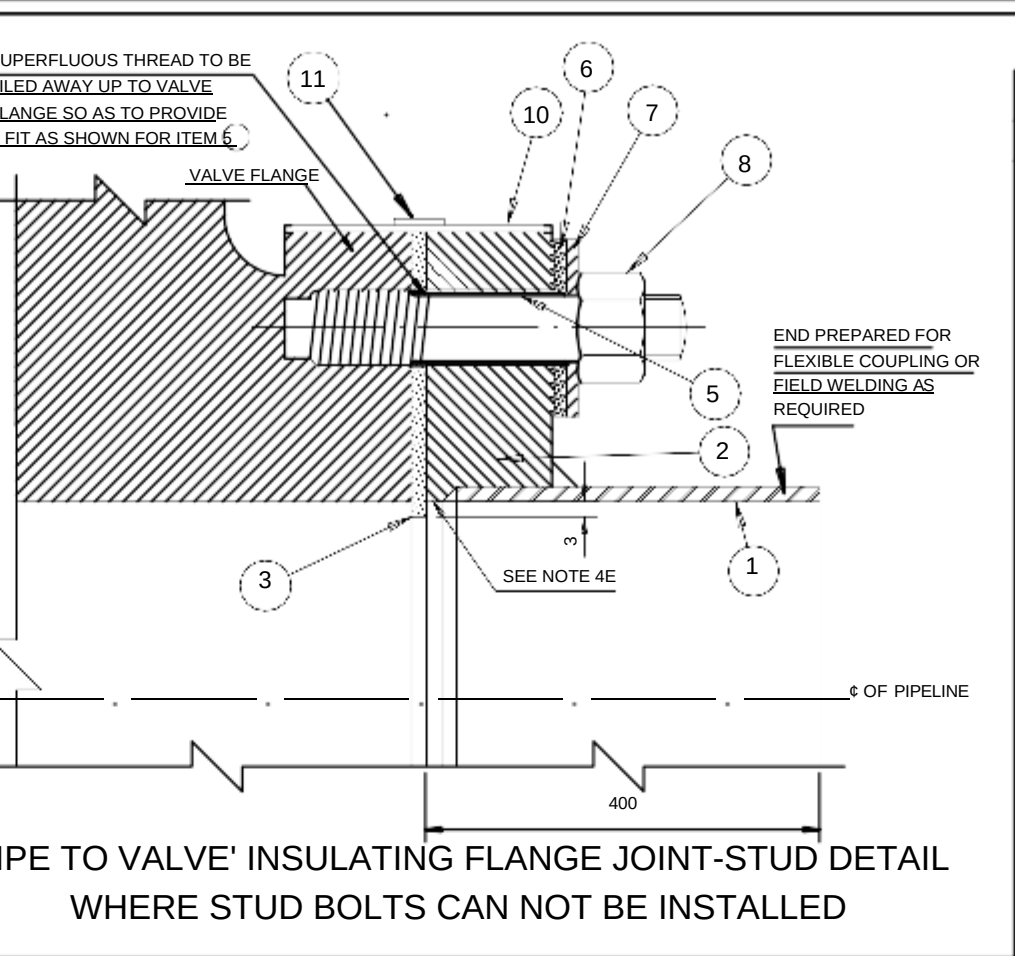
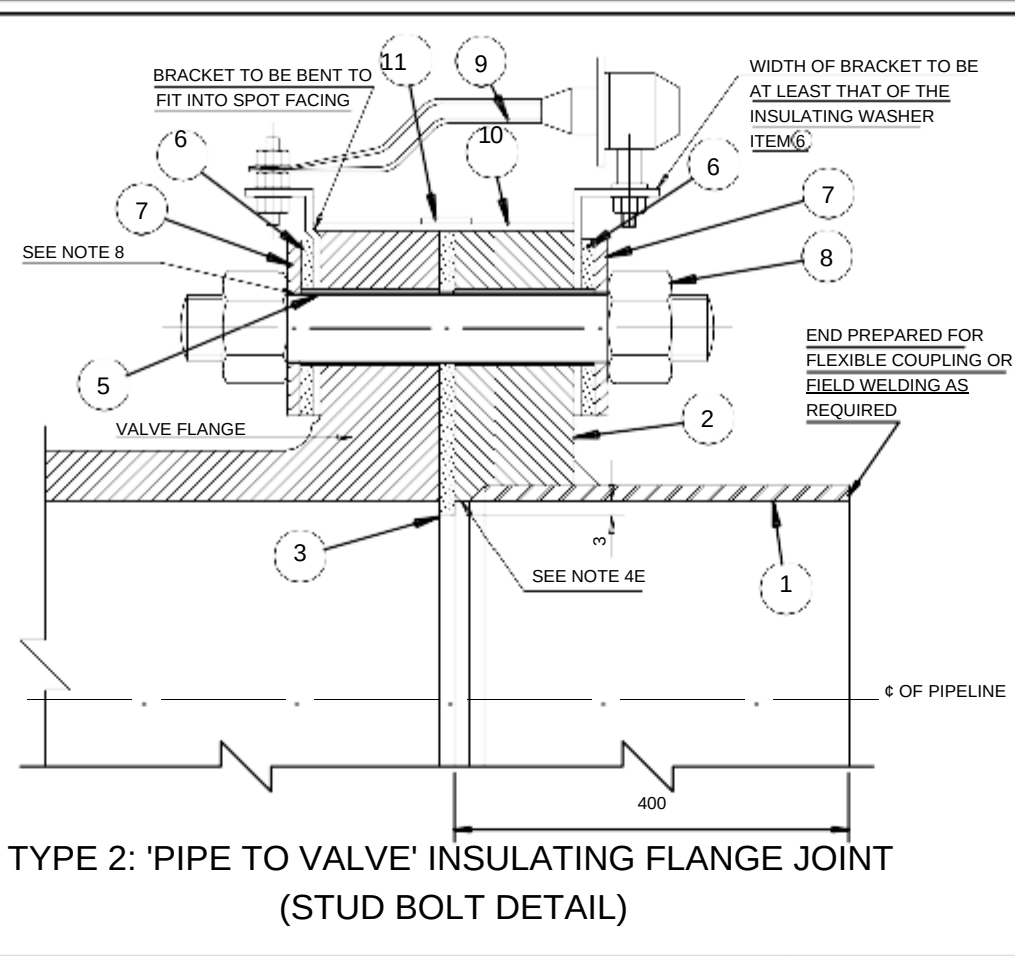
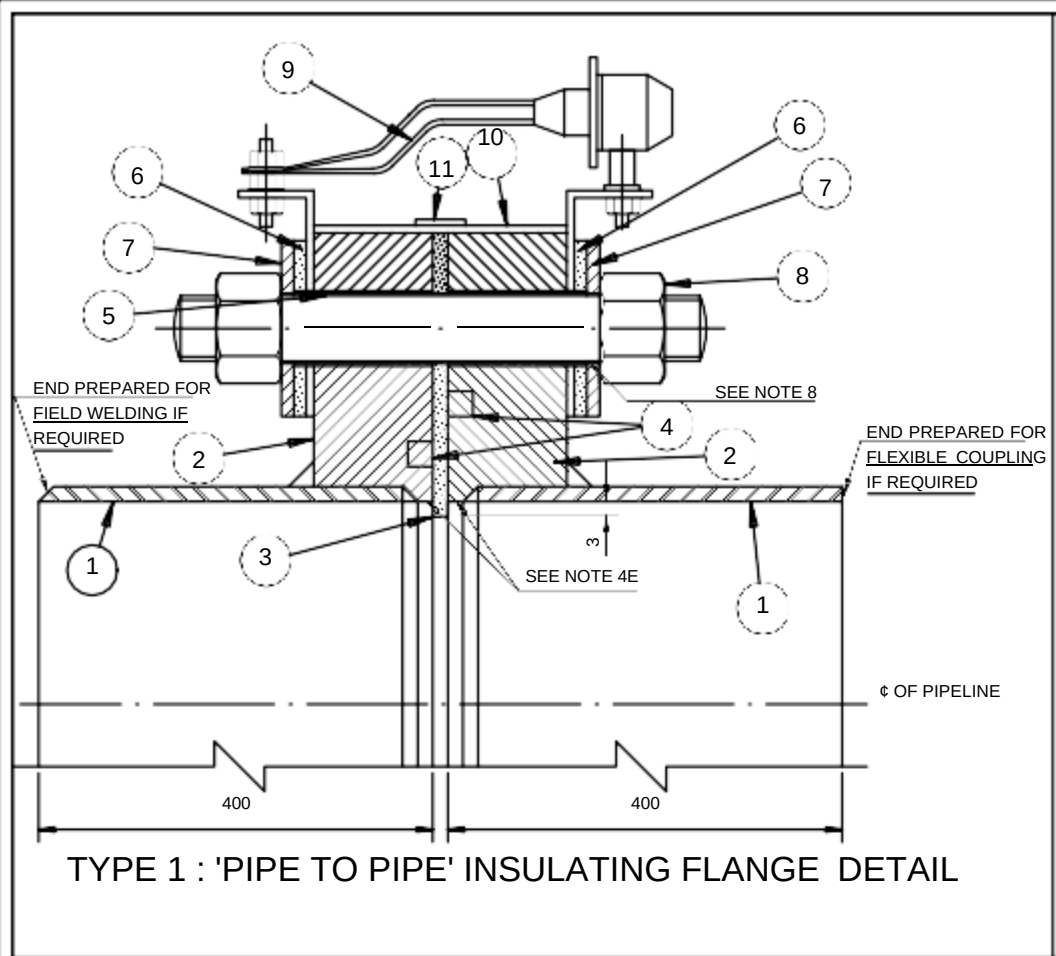
ISSUE FOR TENDER ONLY

 MARISWE PROVIDING A BETTER WATERWORKS SOLUTIONS MARISWE (Pty) Ltd P.O.Box 25549 Monument Park 0105 TEL: +27 (0) 12 424 9700	DESIGNED	K.M	19.05.2014	 Johannesburg Water	TURBINE HALL 65 NTEMI PILISO STREET NEWTOWN 2113 TEL: (011) 688-1542 FAX: (011) 688-6604	JW14301R: LINBRO WATER UPGRADES STEEL STAIRCASE LAYOUT	SCALE	REV:	AMENDMENTS	APPROVED DATE:	DRAWING-No. JW14301R-DET27-W01
	DRAWN	W.K	19.05.2014				AS SHOWN	T	ISSUE FOR TENDER	12/07/2024	
	CHECKED	K.G	14/02/2019								
	APPROVED BY: K.GOVENDER		09/07/2024								
		SIGNATURE	DATE								
	ECSA REG. No.	201470227									
	CHECKED										
	APPROVED BY: E.MUDAU										
		SIGNATURE	DATE								
	ECSA REG. No.										

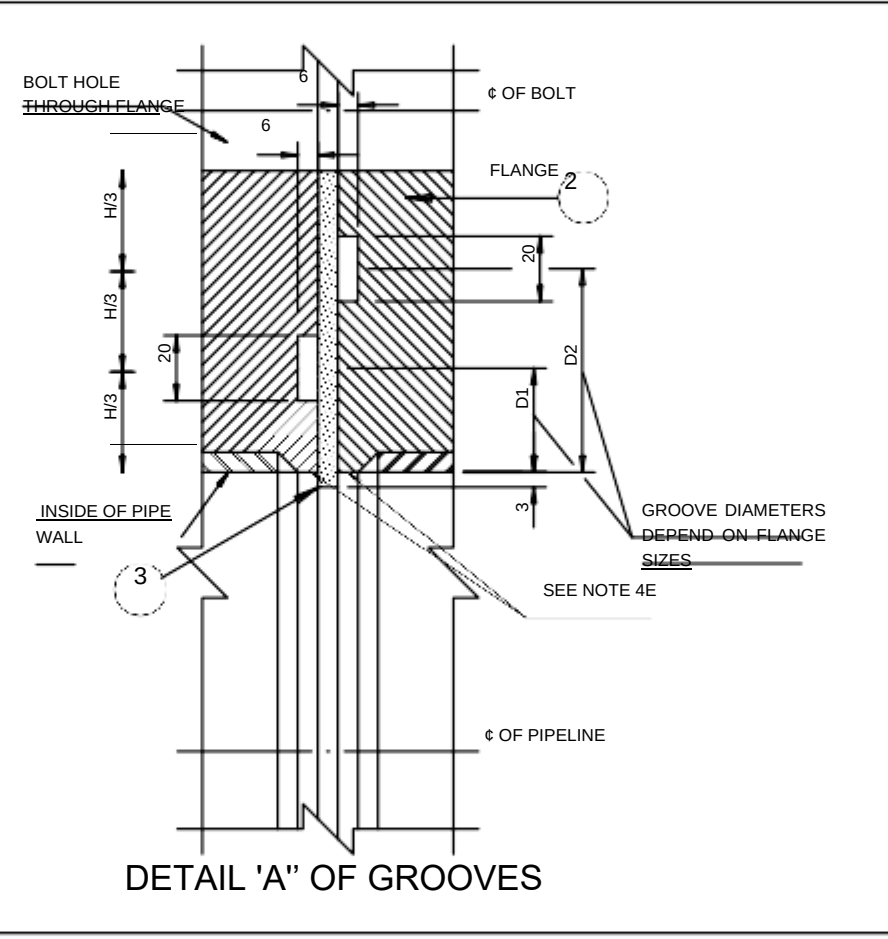
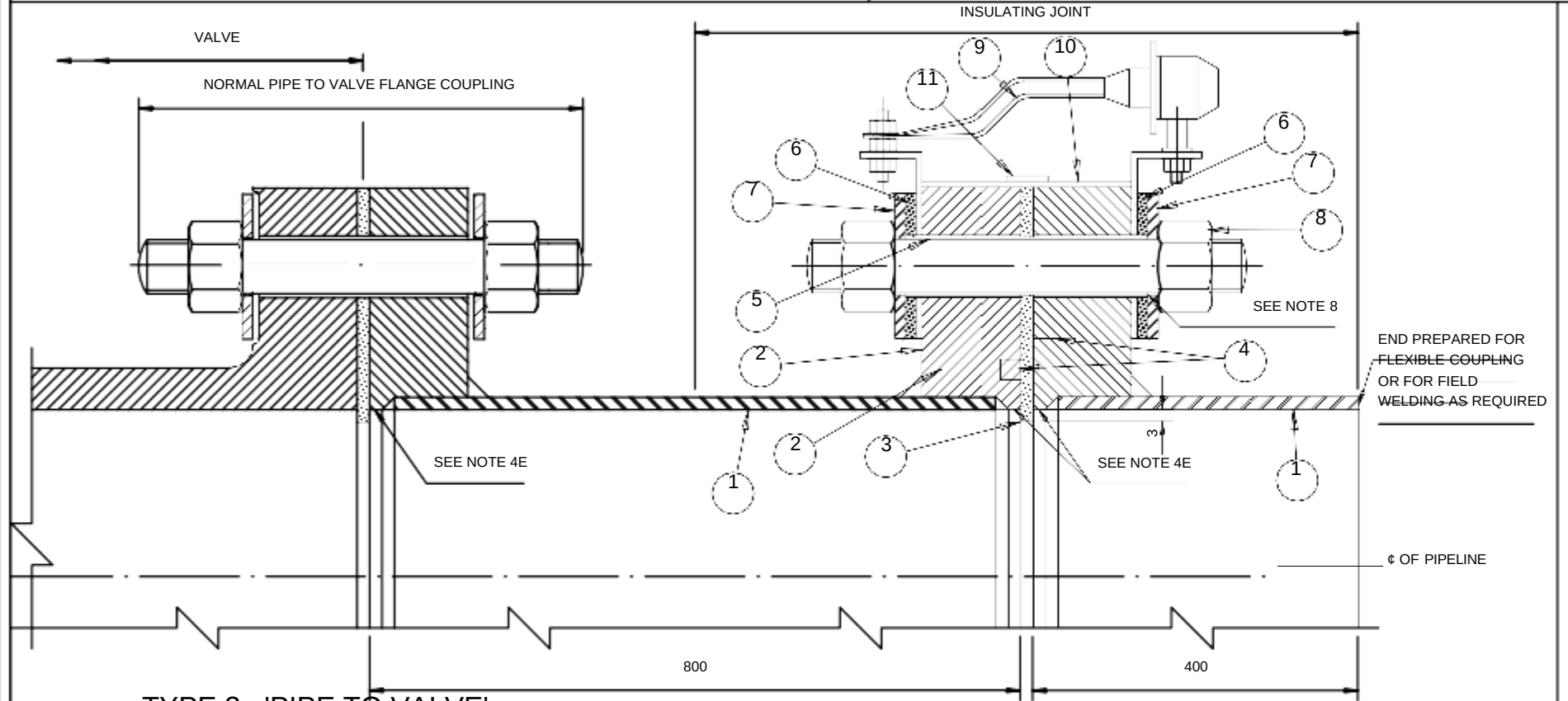


TYPICAL SECTION
SCALE 1:20

[illegible]



FLANGE INSULATING MATERIALS	
ITEM	DESCRIPTION
1	PIPE : DIAMETER, WALL THICKNESS, STEEL GRADE, PROTECTION AND END PREPARATIONS TO BE AS SPECIFIED ELSEWHERE.
2	FLANGES : TO BE FULL FACED, MANUFACTURED AND DRILLED OFF-CENTRE TO BS 4504 OR ISO 2084 FROM STEEL PLATE GRADE 43A TO BS 4360, MACHINED ON FRONT, BACK AND OUTSIDE FACES. SEE NOTE 4.
3	INSULATING GASKET : MATERIAL SPECIFICATION : SEE TABLE 1.
4	O-RING : 12 mm DIAMETER NATURAL RUBBER RING TO SABS 974, CLASS D, HARDNESS 60 IRH DEGREES, TOLERANCE 5 IRH DEGREES.
5	INSULATING SLEEVE : 1 mm TO 1.5 mm THICK GLASS-FIBRE REINFORCED POLYESTER SLEEVE FOR EACH BOLT. LENGTH OF SLEEVE TO BE SUCH THAT TOTAL GAP ON SLEEVE LENGTH BETWEEN INSIDE FACES OF STEEL WASHERS IS BETWEEN 2 TO 3 mm.
6	INSULATING WASHER : 6.3 mm THICK FABRIC REINFORCED PHENOLIC RESIN WASHER WITH O.D. THE SAME AS THAT OF THE MACHINED STEEL WASHER, 2 OFF FOR EACH STUDBOLT : ID TO BE A SLIDING FIT OVER OD OF ITEM 5.
7	STEEL WASHERS : MACHINED WITH DIAMETER AND THICKNESS TO SABS 1149, TABLE 3.
8	STUDBOLTS & STUDS : GRADE 8.8 AND NUTS GRADE 8 TO S.A.B.S. 136. STUDBOLT 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 SUITABLE SMALLER NUT TO BE USED.
9	EXPLOSION-PROOF SPARK GAP : TYPE EXFS COMPLETE WITH HOT-DIP GALVANISED MILD STEEL MOUNTING BRACKETS TO SUIT THE FLANGE BOLT, AS SUPPLIED BY MESSRS 'PONTIS (RSA)' OR SIMILAR APPROVED. THE WIDTH OF THE HOLDING BRACKET OF THE EXPLOSION PROOF SPARK GAP SHALL BE THE SAME AS THE STEEL AND INSULATING WASHERS (ITEM 6 & 7) AND THE BOTTOM END BE ROUNDED OFF TO FIT INTO THE SPOT FACED AREA OF THE VALVE AND OR STEEL FLANGE.
10	WHITE PLASTIC BACKED POLYMER MODIFIED BITUMINOUS TAPE : 1.5 TO 2.0 mm THICK OR SIMILAR APPROVED WITH A MINIMUM 25 mm OVERLAP. IN CASE OF SURFACE IRREGULARITIES i.e. STEPPED FLANGES ETC. AN APPROVED MASTIC MATERIAL SHALL BE USED TO PROVIDE A SMOOTH CONTOUR FOR SUBSEQUENT TAPE APPLICATION.
11	CODING RED COLOUR BAND : OF 30 mm WIDE PLASTIC BACKED ELECTRICAL TAPE TO SABS 122-1975.



NOTES:

- INSULATING JOINTS ARE TO BE HOUSED IN A WELL DRAINED AND VENTILATED CHAMBER WITH INSPECTION ACCESS.
- TYPES 1 AND 3 INSULATING JOINTS SHALL BE HYDRAULIC TESTED IN FACTORY TO 1.25 TIMES THE FLANGE CLASSIFICATION. THE TYPE 2 FLANGE SETS SHALL NOT LEAK AT FIELD TEST PRESSURE.
- THE ASSEMBLED INSULATING JOINT SHALL BE TESTED AS FOLLOWS FOR ELECTRICAL DISCONTINUITY.
 - PLACE A FREE FLOATING COMPASS ON TOP OF THE INSULATING FLANGE. THE NEEDLE WILL ALIGN PARALLEL TO THE PIPELINE I) BRIDGE THE TWO SIDES OF THE INSULATING JOINT WITH EITHER A 12 VOLT HEAVY DUTY CAR BATTERY OR WELDING GENERATOR. IF THE INSULATING FLANGE IS NOT FUNCTIONING THE COMPASS NEEDLE WILL DEFLECT TO A POSITION ORTHOGONAL TO PIPELINE. IF THE INSULATION JOINT IS FUNCTIONING CORRECTLY, THE NEEDLE WILL DEFLECT 5 TO 7 DEGREES AND THE MAXIMUM CURRENT FLOWING ACROSS THE JOINT SHOULD NOT EXCEED 50 AMPS. II) SHOULD A FAULTY INSULATING JOINT BE LOCATED THEN THE FAULTY MATERIALS SHALL BE REPLACED AND THE JOINT SYSTEM RE-TESTED. III) IT IS RECOMMENDED THAT EACH BOLT BE TESTED FOR NON-CONTINUITY BEFORE TIGHTENING THEREOF. THE SAME MUST APPLY WHEN A JOINT IS TESTED AND FOUND TO BE CONTINUOUS. THE FAULTY BOLTS MUST BE NOTED.
- THE FINAL DEFLECTED POSITION OF THE COMPASS NEEDLE TO BE NOTED, ie. THE STABILIZED POSITION AND NOT THE INITIAL MOVEMENTS

TABLE 1 : THE INSULATING GASKET CONFIGURATION AND GASKET MATERIALS BETWEEN PIPE/VALVE FLANGES TO BE BASED ON THE FOLLOWING PRESSURE RATINGS AND DIAMETERS :	
INSULATING GASKET MATERIAL	PRESSURE RATING ie. FIELD TEST PRESSURE
1. HDPE : 1.1 A 3.2 mm THICK HIGH DENSITY POLYETHYLENE TO PEH, HOSTALEN G.M. 5010 SA SPECIFICATION, FULL FACE GASKET, IN ONE PIECE, GROOVE DETAIL 'A' WITH 'O'-RINGS NOT REQUIRED. GASKET I.D. TO BE 6 mm SMALLER THAN THE PIPE I.D. 1.2 A 3.2 mm THICK HIGH DENSITY POLYETHYLENE, TO PEH, HOSTALEN GM 5010 SA SPECIFICATION , FULL FACE GASKET, IN ONE PIECE, WITH GROOVE DETAIL 'A' AND 'O'-RINGS. GASKET I.D. TO BE 6 mm SMALLER THAN PIPE I.D.	< 2.5 MPa =
OR 2. PHENOLIC WITH NEOPRENE FACING : 2.1 A 3.2 mm THICK FABRIC REINFORCED PHENOLIC (TESTED TO BS 5102 APPENDICES A-M : TYPE III) FULL FACED GASKET IN ONE PIECE WITH NEOPRENE OR NITRILE FACES 0.8 mm THICK. (GROOVE DETAIL 'A' WITH 'O'-RINGS NOT REQUIRED). GASKET I.D. TO BE 6 mm SMALLER THAN THE PIPE I.D. 2.2 A 3.2 mm THICK FABRIC REINFORCED PHENOLIC FULL FACED GASKET (TESTED TO BS 5102 APPENDICES A-M : TYPE III) WITH NOT MORE THAN 3 ONLY FACTORY MADE LAP JOINTS, WITH NEOPRENE OR NITRILE FACES 0.8 mm THICK. (GROOVE DETAIL 'A' WITH 'O'-RINGS NOT REQUIRED). THE GASKET I.D. TO BE 6 mm SMALLER THAN THE PIPE I.D.	> 2.5 MPa < 4.6 MPa =
OR 3. PHENOLIC WITH C.A.F. : 3.1 A 3.2 mm THICK FABRIC REINFORCED PHENOLIC (TESTED TO BS 5102 APPENDICES A-M : TYPE III) FULL FACED GASKET, IN ONE PIECE WITH 0.8 mm THICK "PROLOK SUPER" OR SIMILAR COMPRESSED ASBESTOS FIBRE (TO BS 2815 GRADE A) FULL FACED GASKETS ON EACH SIDE. (GROOVE DETAIL 'A' WITH 'O'-RING NOT REQUIRED). THE GASKET I.D. TO BE 6 mm SMALLER THAN THE PIPE I.D. 3.2 A 3.2 mm THICK FABRIC REINFORCED PHENOLIC (TESTED TO BS 5102 APPENDICES A-M : TYPE III) FULL FACED GASKET WITH NOT MORE THAN 3 ONLY FACTORY MADE LAP JOINTS, WITH 0.8 mm THICK "PROLOK SUPER" OR SIMILAR COMPRESSED ASBESTOS FIBRE (TO BS 2815 GRADE A) FULL FACED GASKETS ON EACH SIDE. (GROOVE DETAIL 'A' WITH 'O'-RING NOT REQUIRED). THE GASKET I.D. TO BE 6 mm SMALLER THAN THE PIPE I.D.	< 4.6 MPa =
	> 1 200 mm

MARISWE (Pty) Ltd
P.O.Box 25549
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DESIGNED	W.K.	19.05.2014
DRAWN	W.K.	19.05.2014
CHECKED	K.G.	14/02/2019
APPROVED BY:	K.GOVENDER	09/07/2024
ECSA REG. No.	201470227	DATE
CHECKED		
APPROVED BY:	E.MUDAU	
ECSA REG. No.		

Johannesburg Water

TURBINE HALL
65 NTEMI PILISO STREET
NEWTOWN
2113

TEL: (011) 688-1542
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Joburg

JW14301R: LINBRO WATER UPGRADES

TYPICAL INSULATION KIT

SCALE	REV:	AMENDMENTS	APPROVED DATE:	DRAWING NO: JW14301R-DET29-W01
N.T.S	1	ISSUE FOR TENDER	12/07/2024	

ISSUE FOR TENDER ONLY

50mm
ON ORIGINAL

JW14301R

PROJECT No.

DET29

DRAWING No.

T

REV.

A1

SHEET

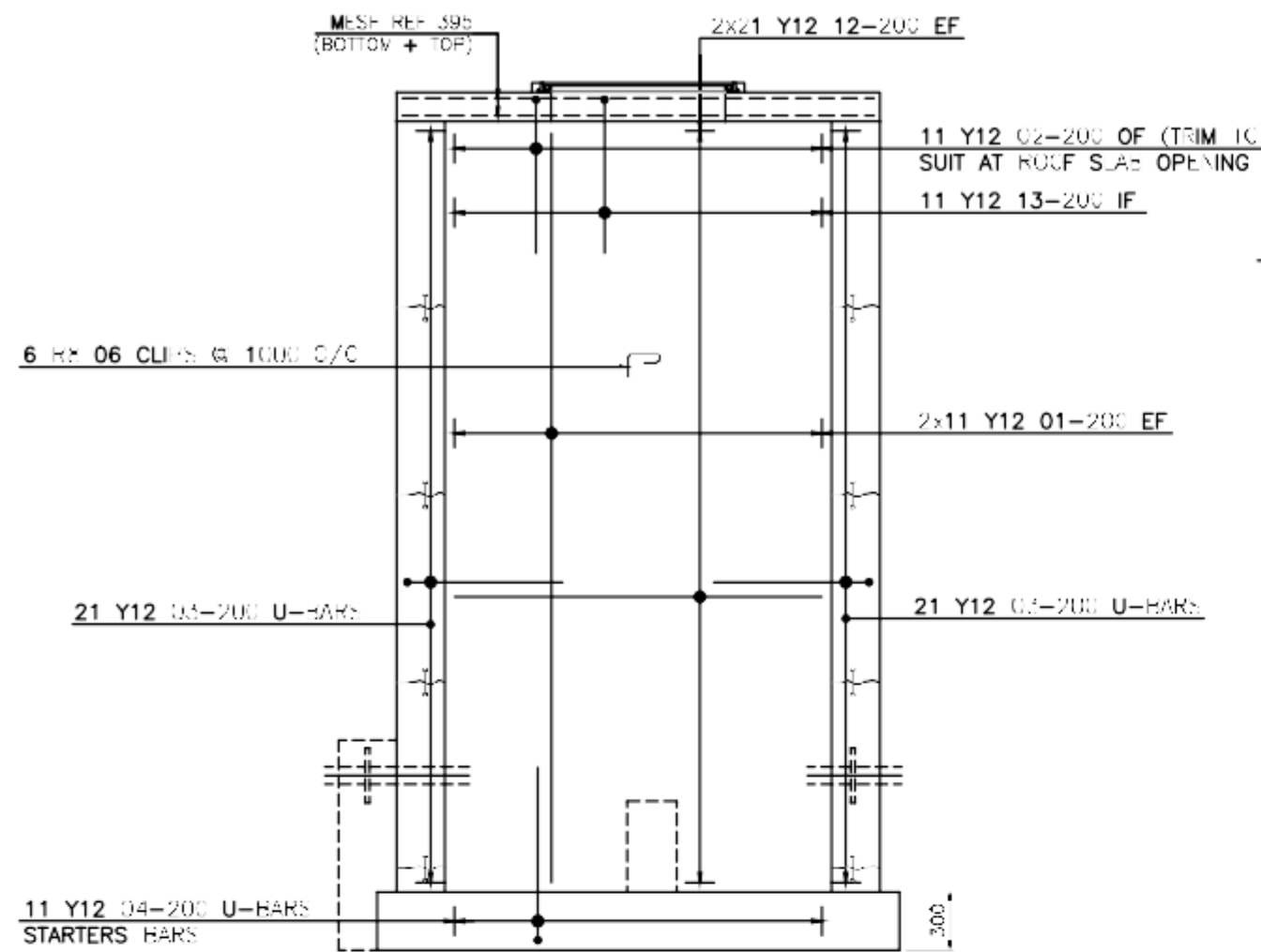
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OF

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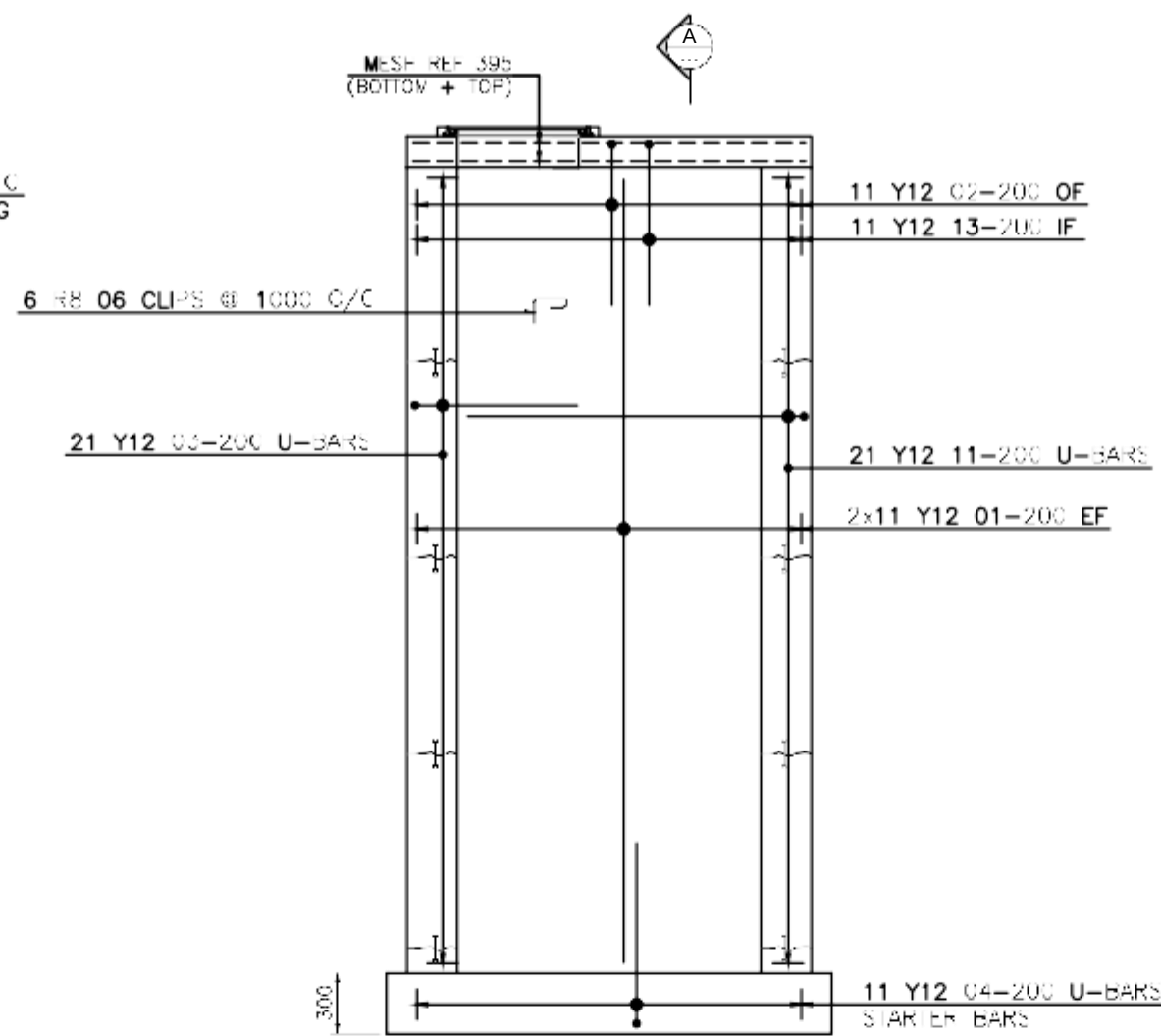
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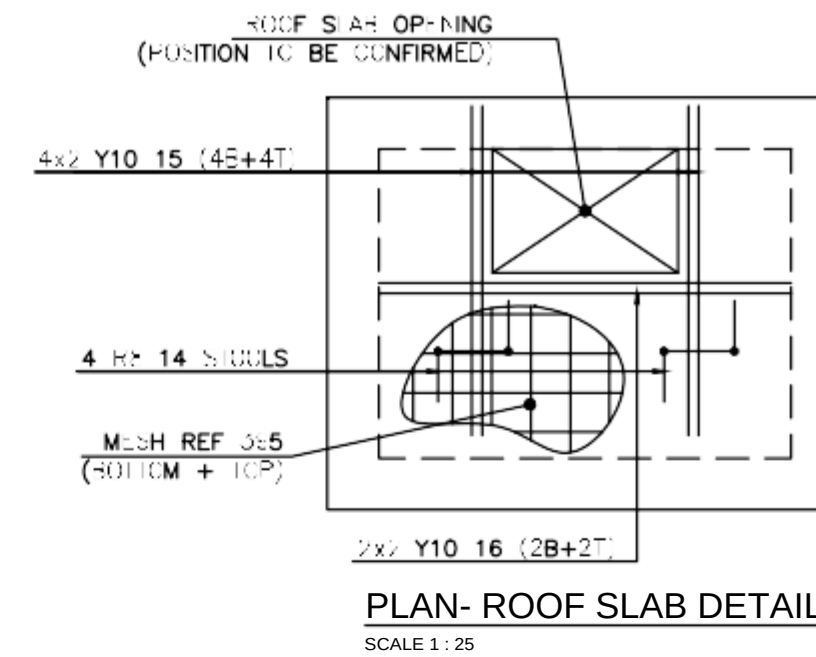
**ELEVATION- WALL 1 (WALL 2 SIMILAR)
REINFORCEMENT DETAILS**

2 REQUIRED
SCALE 1 : 25



**ELEVATION- WALL 3 (WALL 4 SIMILAR)
REINFORCEMENT DETAILS**

2 REQUIRED
SCALE 1 : 25



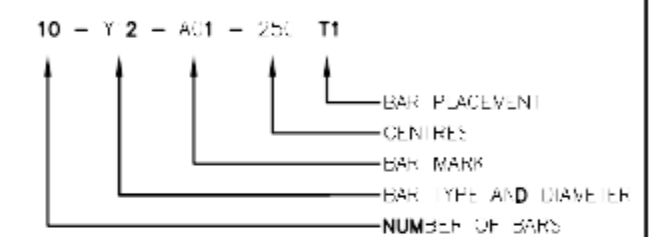
NOTES:

1. REINFORCEMENT TO SANS 920: 2011 AND SANS 252: 2011
2. COVER TO REINFORCEMENT:
 - BASE SLAB = 40mm
 - WALLS = 40mm
 - ROOF SLAB = 30mm
3. MINIMUM LAP LENGTH = 45 x SMALLER BAR DIAMETER
MINIMUM LAP DIVISION INDICATED TO BE APPLICABLE.

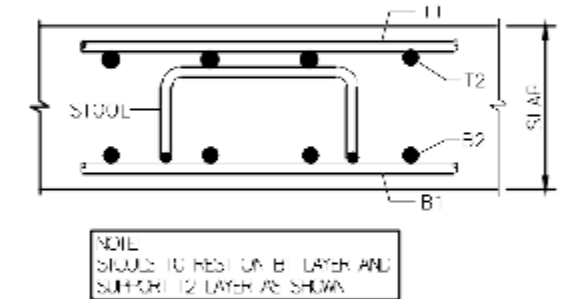
REINFORCING LEGEND:

1. T	-	TOP
2. M	-	MIDDLE
3. B	-	BOTTOM
4. T1	-	FIRST UP LAYER
5. T2	-	SECOND UP LAYER
6. B1	-	FIRST BOTTOM LAYER
7. B2	-	SECOND BOTTOM LAYER
8. ABH	-	ALTERNATE BARS REVERSED
9. AI	-	ALTERNATE BARS
10. NF	-	N-AP FACE
11. FF	-	FAR FACE
12. EF	-	EACH FACE
13. EW	-	EACH WAY

REINFORCING NOTATION:

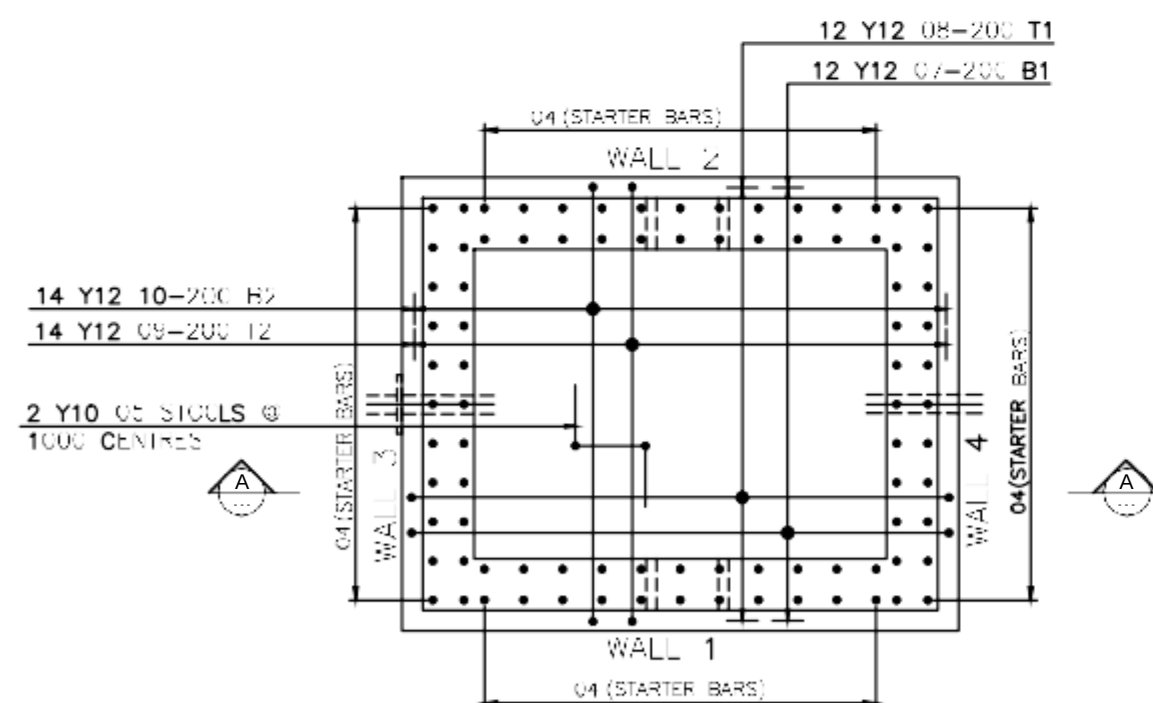
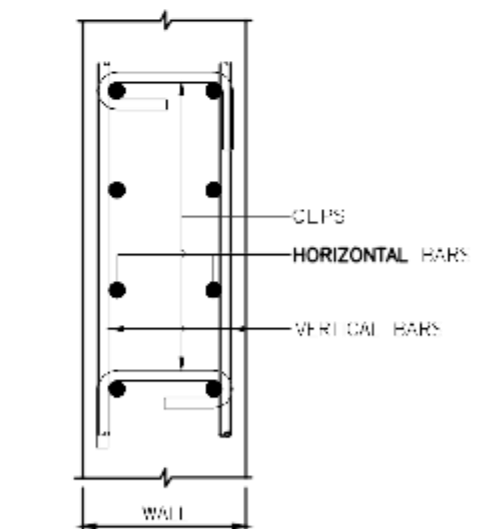


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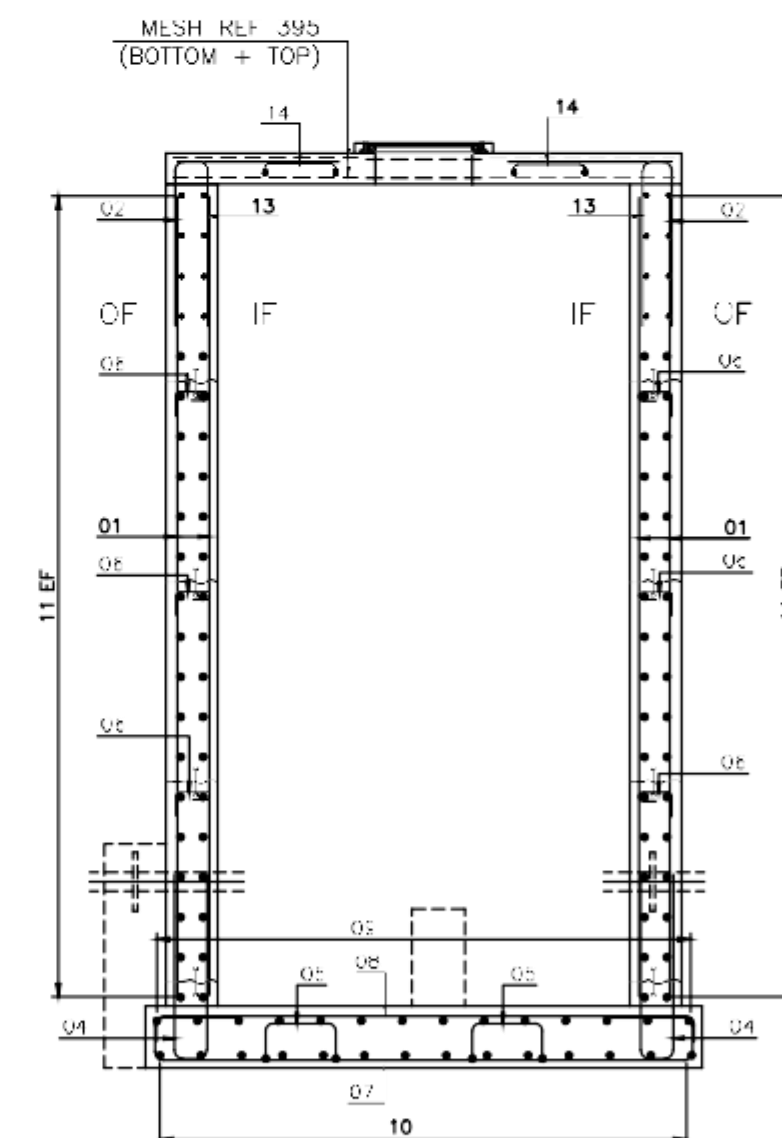
CLIPS DETAIL:

CLIPS TO BE PLACED AS SHOWN



**BASE SLAB PLAN- TYPICAL SCOUR VALVE CHAMBER FOR
PIPES > 400mm ND - REINFORCEMENT DETAILS**

1 REQUIRED
SCALE 1 : 25

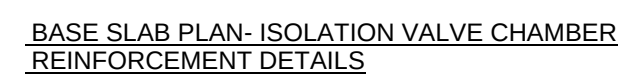
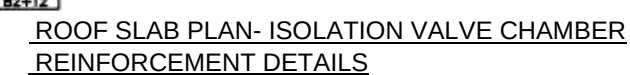
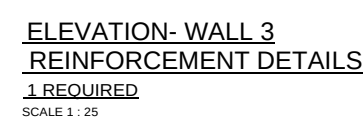
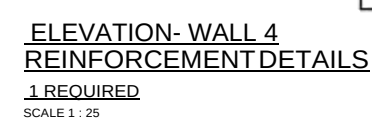
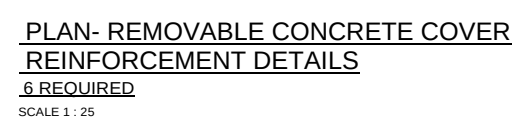
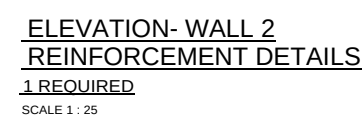
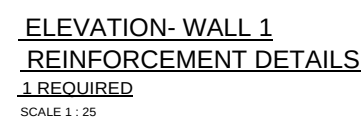


SECTION A-A

SCALE 1 : 25

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MEMBER				REINFORCEMENT						BENDING DIMENSIONS FOR SHAPE CODES (SABS 82)						FIXING AND NON STANDARD BENDING DETAILS								
Description				Mark	Type & Size	No. of Mbers	No. of Bars	Total	Cutting Length	Shape code	A	B	C	D	E or r									
BASE SLAB-SCOUR VALVE CHAMBER				04	Y12	1	22	22	1925	38	900	170	(900)											
				05	Y10	1	2	2	1225	83	350	180	300	300										
				07	Y12	1	12	12	3750	55	400	220	2620	220	(400)									
				08	Y12	1	12	12	2825	38	130	2620	(130)											
				09	Y12	1	14	14	2325	38	130	2120	(130)											
				10	Y12	1	14	14	3200	55	400	195	2120	195	(400)									
WALLS 1 & 2				01	Y12	2	22	44	3875	20														
				02	Y12	2	11	22	1575	37	800	(800)												
				03	Y12	2	42	84	1700	38	810	145	(805)											
				06	R8	2	6	12	375	85	120	165	50	(85)										
				12	Y12	2	42	84	1900	20														
				13	Y12	2	11	22	925	37	800	(150)												
WALLS 3 & 4				01	Y12	2	22	44	3875	20														
				02	Y12	2	11	22	1575	37	800	(800)												
				03	Y12	2	21	42	1700	38	810	145	(805)											
				06	R8	2	6	12	375	85	120	165	50	(85)										
				11	Y12	2	21	42	3425	38	1670	145	(1670)											
				13	Y12	2	11	22	925	37	800	(150)												
ROOF SLAB-SCOUR VALVE CHAMBER				14	R8	1	4	4	900	83	350	50	250	250										
				15	Y10	1	8	8	1600	20														
Masses (kg)	Size Typ	6	8	10	12	16	20	25	32	40	Total (Kg)	Sheet Title	JW14301R: LINBRO WATER UPGRADES TYPICAL SCOUR VALVE CHAMBER				Project No. JW14301R		Schedule No. 1					
	'R'		4.9								4.9	Project	JW14301R: LINBRO WATER UPGRADES				Ref. Dwg. DET30		Revision Suffix					
	'Y'			9.5	1038.9						1048.3	Section	TYPICAL SCOUR VALVE CHAMBER FOR PIPES>400mm ND				Date 29/06/2016		Drawn D.G		Checked S.M			
	Total (Kg)		4.9	9.5	1038.9						1053.2													



A schematic diagram of a vertical bar assembly. It shows a central vertical bar with several horizontal bars intersecting it. The horizontal bars are labeled 'HORIZONTAL BARS'. The vertical bar is labeled 'VERTICAL BARS'. The assembly is held together by 'CLIPS' at the top and bottom. The width of the assembly is labeled 'W.A. 1'.

[illegible]

MEMBER		REINFORCEMENT					BENDING DIMENSIONS FOR SHAPE CODES (SABS 82)					FIXING AND NON STANDARD BENDING DETAILS	
Description	Mark	Type & Size	No. of Mbers	No. of Bars	Total	Cutting Length	Shape code	A	B	C	D	E or r	
BASE SLAB- ISOLATION VALVE CHAMBER	01	Y12	1	4	4	5175	38	130	4970	(130)			
	02	Y12	1	4	4	5900	55	350	170	4970	170	(350)	
	03	Y12	1	14	14	6550	55	350	170	5620	170	(350)	
	04	Y12	1	14	14	5825	38	130	5620	(130)			
	05	Y12	1	4	4	3450	55	350	145	2570	145	(350)	
	06	Y12	1	4	4	2775	38	130	2570	(130)			
	07	Y12	1	26	26	3425	38	130	3220	(130)			
	08	Y12	1	26	26	4100	55	350	145	3220	145	(350)	
	34	Y12	1	81	81	1750	38	820	170	(820)			
	39	Y10	1	8	8	1175	83	400	130	300	300		
DETAIL 1	29	Y12	1	10	10	2550	38	1220	170	(1220)			
	41	Y12	1	5	5	1690	55	300	170	820	170	(300)	
	42	Y12	1	5	5	1025	38	130	820	(130)			
	43	Y12	1	14	14	1025	38	130	820	(130)			
	44	Y10	1	4	4	1625	60	570	170				
	45	Y10	1	3	3	1550	60	540	170				
WALL 1	09	Y12	1	44	44	5125	20						
	16	Y12	1	22	22	1375	37	850	(550)				
	17	Y12	1	32	32	975	37	850	(150)				
	30	Y12	1	54	54	4125	20						
	33	Y12	1	44	44	1800	38	850	145	(850)			
M a s s e s (kg)	Size Typ	6	8	10	12	16	20	25	32	40	Total (Kg)	Sheet Title	JW14301R: LINBROWATER UPGRADES ISOLATION VALVE CHAMBER
	'R'											Project	JW14301R: LINBROWATER UPGRADES
	'Y'										1100.3	Section	ISOLATION VALVE CHAMBER AND REMOVABLE CONCRETE COVER
	Total (kg)										1100.3	Date	24/06/2016
												Drawn	D.G
												Checked	S.M

MEMBER		REINFORCEMENT					BENDING DIMENSIONS FOR SHAPE CODES (SABS 82)					FIXING AND NON STANDARD BENDING DETAILS	
Description	Mark	Type & Size	No. of Mbers	No. of Bars	Total	Cutting Length	Shape code	A	B	C	D	E or r	
WALL 4	18	Y12	1	10	10	1100	37	130	(1000)				
	30	Y12	1	28	28	4125	20						
	31	Y12	1	13	13	1575	37	850	(750)				
	32	Y12	1	8	8	2650	37	2550	(130)				
	33	Y12	1	44	44	1800	38	850	145	(850)			
	40	R8	1	6	6	375	85	120	165	50	(85)		
	46	Y12	1	4	4	1275	38	590	145	(590)			
	47	Y12	1	10	10	800	37	130	(700)				
	54	Y12	1	8	8	675	37	570	(130)				
ROOF SLAB- ISOLATION VALVE CHAMBER	11	Y12	1	12	12	5800	38	130	5600	(130)			
	12	Y12	1	10	10	2200	37	2100	(130)				
	13	Y12	1	12	12	3225	20						
	14	Y12	1	10	10	925	37	820	(130)				
	15	Y12	1	20	20	1000	38	130	790	(130)			
	19	Y12	1	12	12	3425	38	130	3225	(130)			
	20	Y16	1	8	8	3225	20						
	21	Y16	1	8	8	4450	20						
	22	Y10	1	5	5	750	60	140	170				
	23	Y10	1	3	3	700	60	110	170				
	24	Y12	1	18	18	2075	38	130	1870	(130)			
	25	Y12	1	6	6	4675	38	130	4460	(130)			
	26	Y12	1	2	2	925	38	130	715	(130)			
M a s s e s (kg)	Size Typ	6	8	10	12	16	20	25	32	40	Total (Kg)	Sheet Title	JW14301R: LINBROWATER UPGRADES ISOLATION VALVE CHAMBER
	'R'										0.9	Project	JW14301R: LINBROWATER UPGRADES
	'Y'										575.7	Section	ISOLATION VALVE CHAMBER AND REMOVABLE CONCRETE COVER
	Total (kg)										576.6	Date	24/06/2016
												Drawn	D.G
												Checked	S.M

MEMBER		REINFORCEMENT					BENDING DIMENSIONS FOR SHAPE CODES (SABS 82)					FIXING AND NON STANDARD BENDING DETAILS	
Description	Mark	Type & Size	No. of Mbers	No. of Bars	Total	Cutting Length	Shape code	A	B	C	D	E or r	
WALL 1	40	R8	1	14	14	375	85	120	165	50	(85)		
	46	Y12	1	4	4	1275	38	590	145	(590)			
WALL 2	09	Y12	1	44	44	5125	20						
	16	Y12	1	27	27	1375	37	850	(550)				
	17	Y12	1	27	27	975	37	850	(150)				
	30	Y12	1	54	54	4125	20						
	33	Y12	1	44	44	1800	38	850	145	(850)			
	40	R8	1	14	14	375	85	120	165	50	(85)		
WALL 3	10	Y12	1	36	36	2700	20						
	17	Y12	1	18	18	975	37	850	(150)				
	18	Y12	1	10	10	1100	37	130	(1000)				
	30	Y12	1	28	28	4125	20						
	31	Y12	1	18	18	1575	37	850	(750)				
	32	Y12	1	8	8	2650	37	2550	(130)				
	33	Y12	1	44	44	1800	38	850	145	(850)			
	40	R8	1	6	6	375	85	120	165	50	(85)		
	47	Y12	1	10	10	800	37	130	(700)				
	54	Y12	1	8	8	675	37	570	(130)				
WALL 4	10	Y12	1	36	36	2700	20						
	17	Y12	1	23	23	975	37	850	(150)				
M a s s e s (kg)	Size Typ	6	8	10	12	16	20	25	32	40	Total (Kg)	Sheet Title	JW14301R: LINBROWATER UPGRADES ISOLATION VALVE CHAMBER
	'R'										5.0	Project	JW14301R: LINBROWATER UPGRADES
	'Y'										978.1	Section	ISOLATION VALVE CHAMBER AND REMOVABLE CONCRETE COVER
	Total (kg)										983.1	Date	24/06/2016
												Drawn	D.G
												Checked	S.M

MEMBER		REINFORCEMENT					BENDING DIMENSIONS FOR SHAPE CODES (SABS 82)					FIXING AND NON STANDARD BENDING DETAILS	
Description	Mark	Type & Size	No. of Mbers	No. of Bars	Total	Cutting Length	Shape code	A	B	C	D	E or r	
ROOF SLAB- ISOLATION VALVE CHAMBER	27	Y12	1	56	56	775	38	130	575	(130)			
	28	R8	1	10	10	1000	83	350	100	250	250		
	37	Y12	1	4	4	1400	20						
	38	Y12	1	4	4	1700	20						
	48	R8	1	26	26	800	60	225	90				
	49	R8	1	34	34	700	60	215	90				
	50	Y8	1	8	8	1525	37	150	(1385)				
	51	Y8	1	4	4	2100	37	150	(1950)				
DETAIL 2	35	Y12	2	16	32	1500	20						
	36	Y10	2	16	32	1600	20						
REMOVABLE CONCRETE COVER	52	Y8	6	12	72	1250	60	90	460				
	53	Y10	6	8	48	2350	38	130	2120	(130)			
M a s s e s (kg)	Size Typ	6	8	10	12	16	20	25	32	40	Total (Kg)	Sheet Title	JW14301R: LINBROWATER UPGRADES ISOLATION VALVE CHAMBER
	'R'										21.3	Project	JW14301R: LINBROWATER UPGRADES
	'Y'										237.2	Section	ISOLATION VALVE CHAMBER AND REMOVABLE CONCRETE COVER
	Total (kg)										258.5	Date	24/06/2016
												Drawn	D.G
												Checked	S.M

DESIGNED	D.G	23/06/2016
DRAWN	D.G	23/06/2016
CHECKED	S.M	24/06/2016
APPROVED BY: K. MUJAJI	SIGNATURE	DATE
ECSA REG. No.		
CHECKED		
APPROVED BY: E. MUDAU	SIGNATURE	DATE
ECSA REG. No.		



TURBINE HALL
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FAX: (011) 688-6604

JW14301R: LINBRO WATER UPGRADES
REINFORCEMENT DETAILS- ISOLATION VALVE CHAMBER
BENDING SCHEDULE

SCALE	REV.	AMENDMENTS	APPROVED DATE:
AS SHOWN	T	ISSUE FOR TENDER	12/07/2024

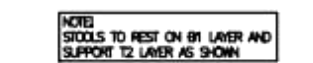
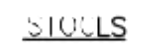
ISSUE FOR TENDER ONLY			
DRAWING-No. JW14301R-DET31A-W01			
ISSUED FOR TENDER			
JW14301R	DET31A	T	
PROJECT No.	DRAWING No.	REV.	
A0	SHEET	1	OF 1
ORIGINAL PAGE SIZE			
FILE No.			

2. COVER TO REINFORCEMENT:

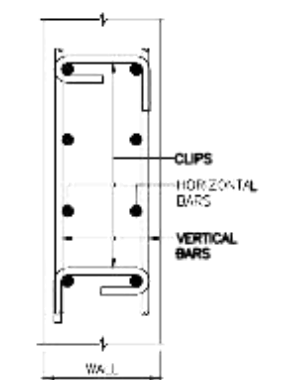
BASE SLAB	= 40mm
WALLS	= 40mm
COLUMNS	= 30mm
ROOF SLAB	= 30mm

REINFORCING LEGEND:

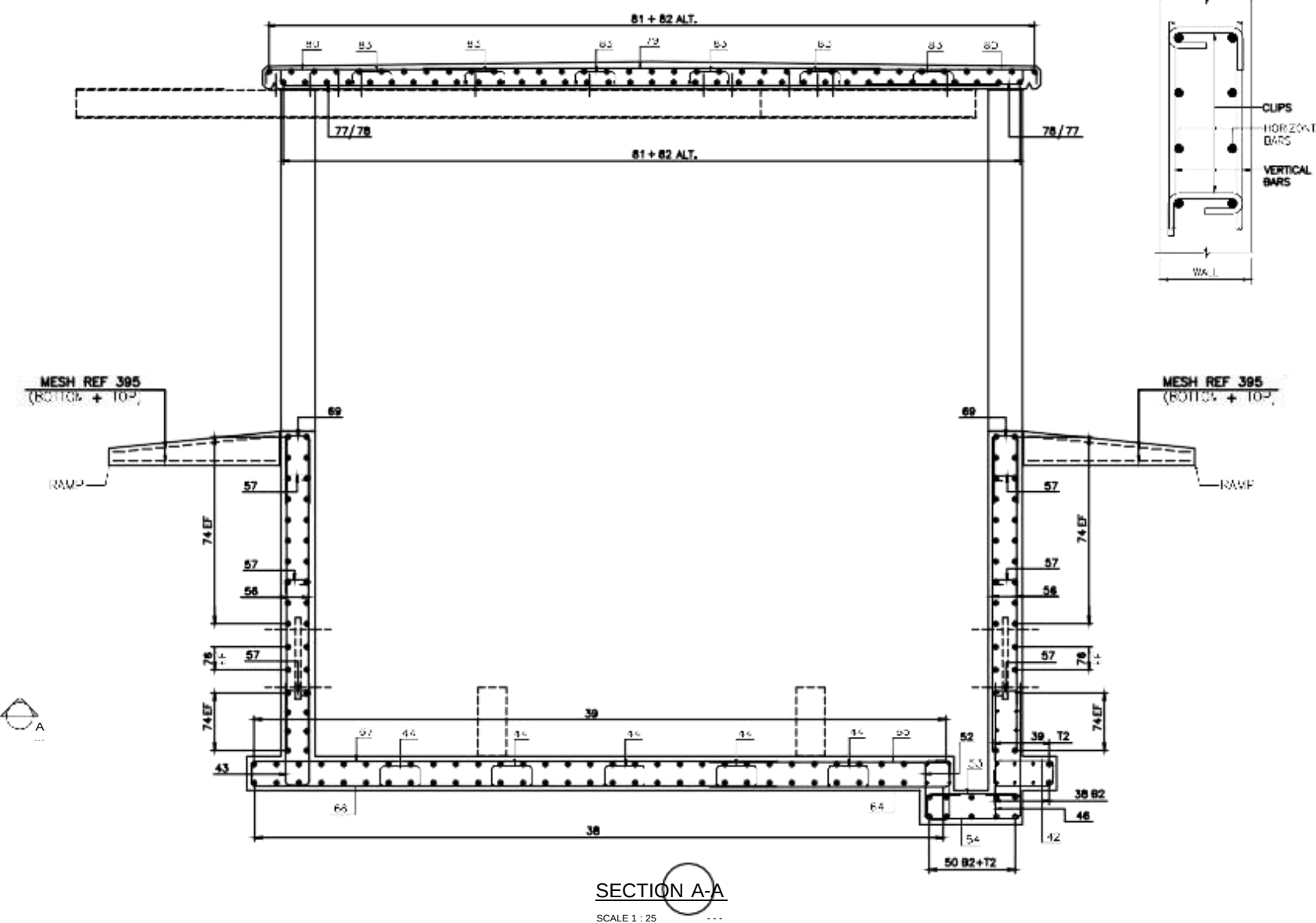
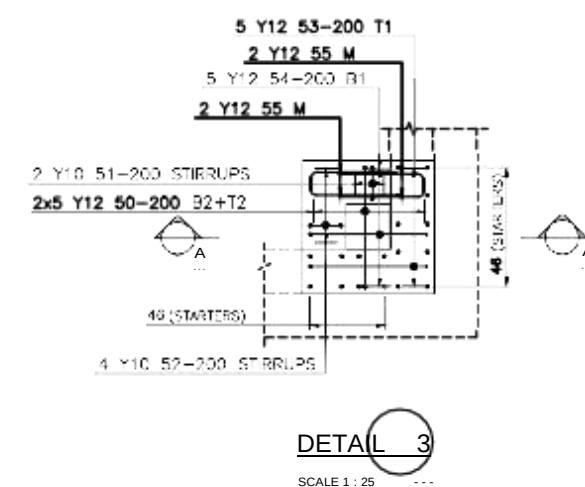
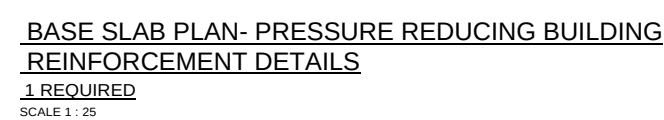
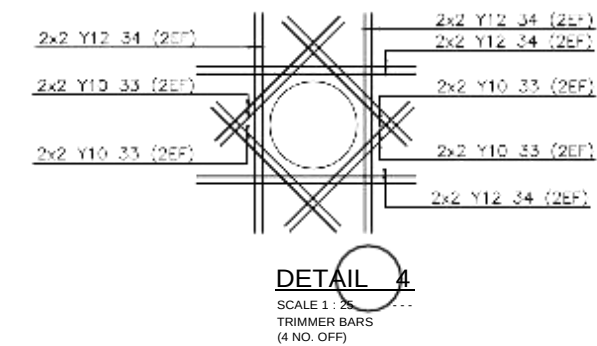
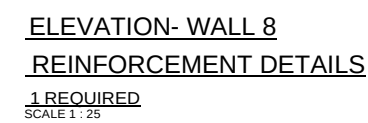
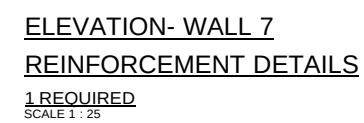
- REINFORCING NOTATION:



CLIPS DETAIL:
CLIPS TO BE PLACED AS SHOWN



MESH REF 395
(60113 + 102)



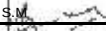
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JW14301R: LINBRO WATER UPGRADES

DESIGNED	F.M	24/06/2016
DRAWN	D.G	24/06/2016
CHECKED		24/06/2016
APPROVED BY: K. MUJAJI	SIGNATURE	DATE
ECSA REG. No.	20110143	
CHECKED		
APPROVED BY: E. MUDAU		
	SIGNATURE	DATE
ECSA REG. No.		

SCALE	REV:	AMENDMENTS	APPROVED DATE:	DRAWING-No. JW14301R-DET32-W01
AS SHOWN	T	ISSUE FOR TENDER	12/07/2024	JW14301R DET32 T
				PROJECT No. DRAWING No.
				A0 SWEET 1 OF 2
				ORIGINAL PAGE SIZE
				FILE NO.

MEMBER		REINFORCEMENT					BENDING DIMENSIONS FOR SHAPE CODES (SABS 82)							FIXING AND NON STANDARD BENDING DETAILS										
Description		Mark	Type & Size	No. of Mbers	No. of Bars	Total	Cutting Length	Shape code	A	B	C	D	E or r											
DETAIL 3		54	Y12	1	5	5	1790	55	300	220	890	220	(300)											
		55	Y12	1	4	4	700	37	590	(130)														
WALL 7		47	Y12	1	30	30	1950	38	900	195	(900)													
		48	Y12	1	8	8	1650	20																
		49	Y12	1	4	4	900	20																
		56	Y12	1	44	44	2790	20																
		57	R8	1	12	12	425	85	120	215	50	(85)												
		69	Y12	1	26	26	1375	38	600	220	(600)													
		74	Y12	1	28	28	4300	20																
		75	Y12	1	4	4	1600	20																
		76	Y12	1	8	8	650	20																
WALL 8		47	Y12	1	30	30	1950	38	900	195	(900)													
		48	Y12	1	8	8	1650	20																
		49	Y12	1	4	4	900	20																
		56	Y12	1	44	44	2790	20																
		57	R8	1	12	12	425	85	120	215	50	(85)												
		69	Y12	1	26	26	1375	38	600	220	(600)													
		74	Y12	1	28	28	4300	20																
		75	Y12	1	4	4	1600	20																
		76	Y12	1	8	8	650	20																
Masses (kg)	Size Typ	4	8	10	12	16	20	25	32	40	Total (Kg)	Sheet Title	JW14301R: LINBROW WATER UPGRADES				Project No.	JW14301R				Schedule No.	2	
	R'		4.0								4.0	Project	JW14301R: LINBRO WATER UPGRADES				Ref. Dwg.	DET32				Revision Suffix		
	Y'				658.3						658.3	Section	FLOW METER CHAMBER				Date	30/06/2018				Drawn	Checked	
	Total (Kg)	4.0			658.3						662.3											D.G.	S.M.	

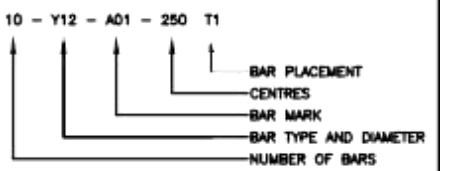
NOTES:

1. REINFORCEMENT TO SANS 262: 2011 AND SANS 262: 2011
2. COVER TO REINFORCEMENT:
BASE SLAB = 40mm
WALLS = 40mm
COLUMNS = 30mm
ROOF SLAB = 30mm
3. MINIMUM LAP LENGTH = 45 x SMALLER BAR DIAMETER, MINIMUM LAP DIMENSION INDICATED TO BE APPLICABLE.

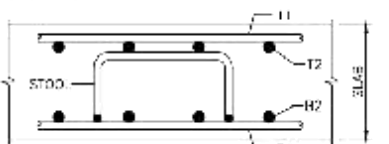
REINFORCING LEGEND:

1. T = TOP
2. M = MIDDLE
3. B = BOTTOM
4. T1 = FIRST TOP LAYER
5. T2 = SECOND TOP LAYER
6. B1 = FIRST BOTTOM LAYER
7. B2 = SECOND BOTTOM LAYER
8. ABR = ALTERNATE BARS REVERSED
9. ALT = ALTERNATING BARS
10. NF = NEAR FACE
11. FF = FAR FACE
12. EF = EACH FACE
13. EW = EACH WAY

REINFORCING NOTATION:



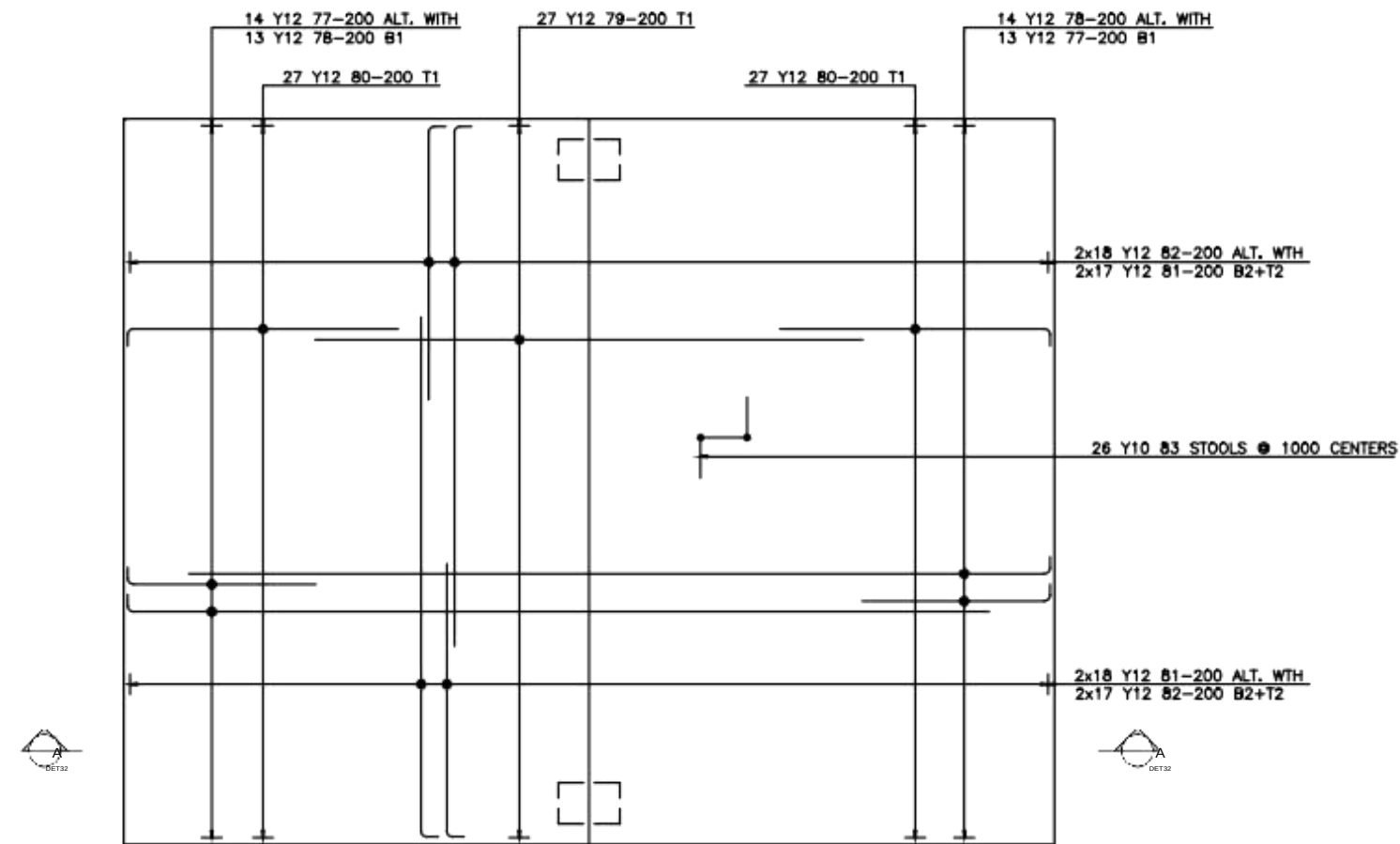
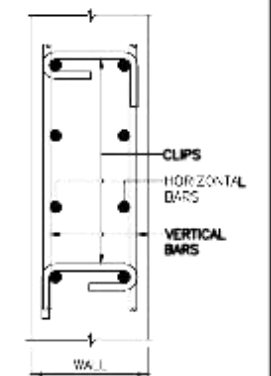
STOOLS



NOTE: STOOLS TO REST ON B1 LAYER AND SUPPORT T2 LAYER AS SHOWN

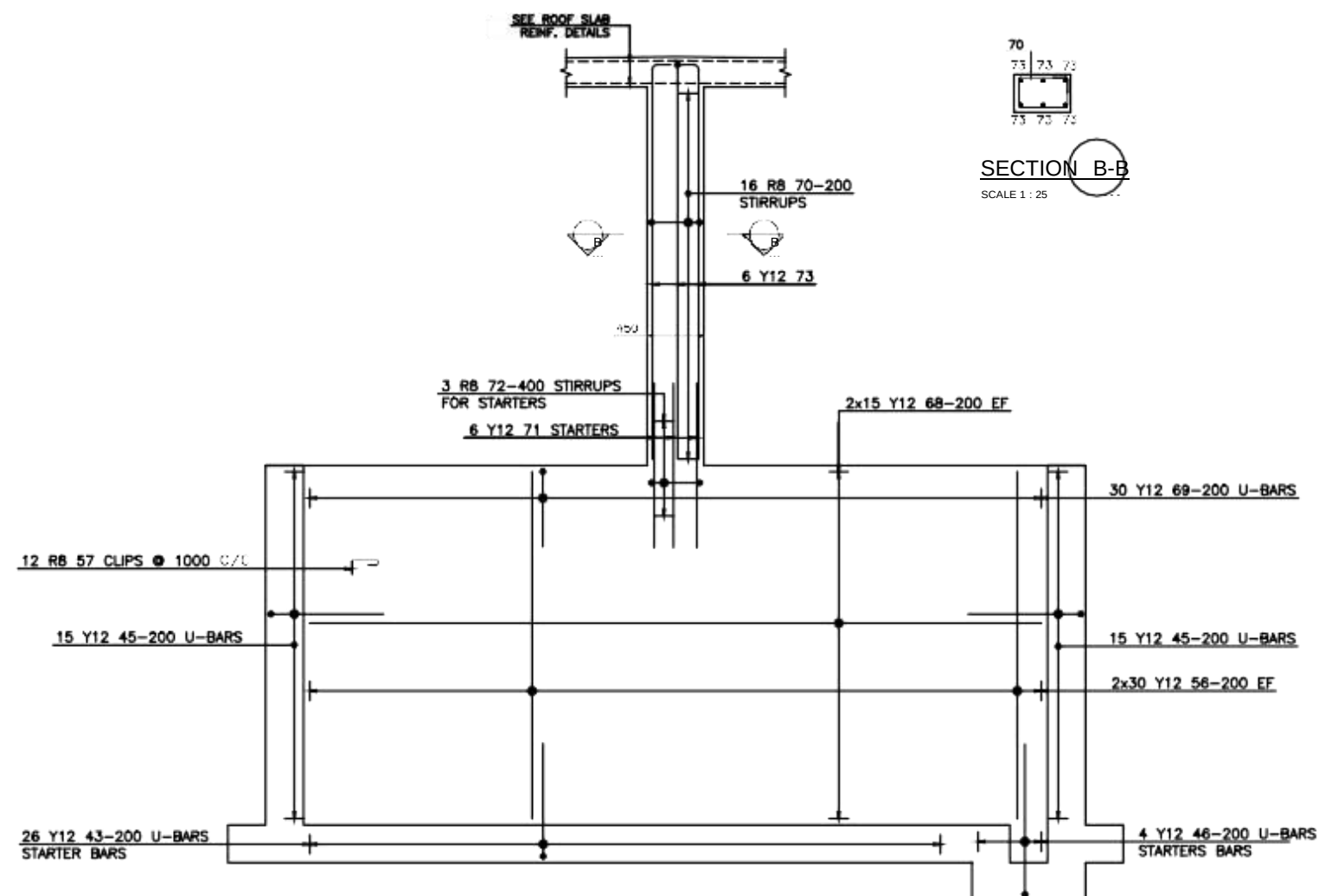
CLIPS DETAIL

CLIPS TO BE PLACED AS SHOWN



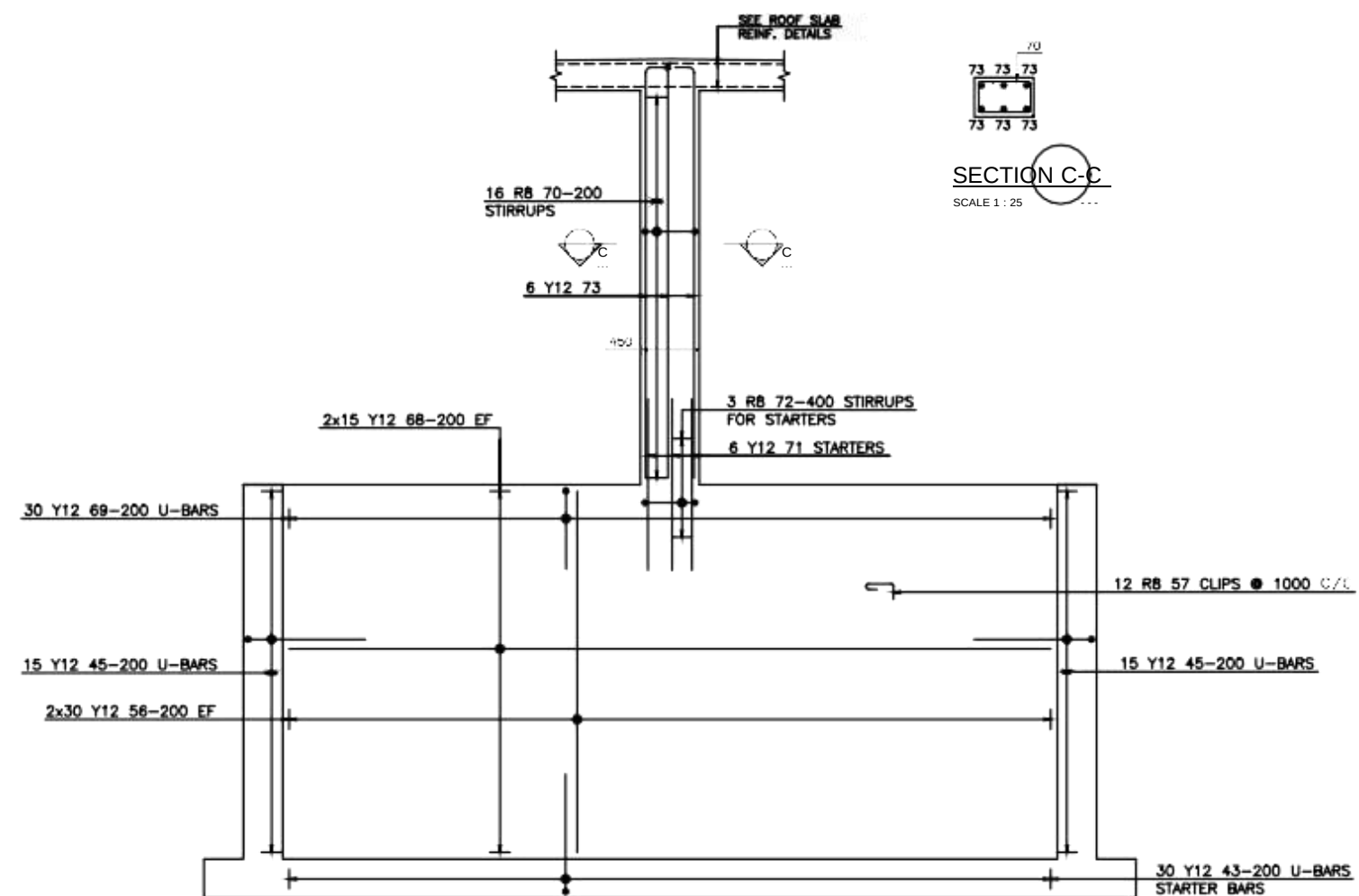
ROOF SLAB PLAN- PRESSURE REDUCING BUILDING
REINFORCEMENT DETAILS

1 REQUIRED
SCALE 1: 25



ELEVATION- WALL 5 AND COLUMN C1 (300 x 450)
REINFORCEMENT DETAILS

1 REQUIRED
SCALE 1: 25



ELEVATION- WALL 6 AND COLUMN C2 (300 x 450)
REINFORCEMENT DETAILS

1 REQUIRED
SCALE 1: 25

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DRAWN	D.G	24/06/2016
CHECKED	S.M	24/06/2016
APPROVED BY:	K. MUJAJI	14/02/2019
ECSA REG. No.	20110143	
CHECKED		
APPROVED BY:	E. MUDAU	
ECSA REG. No.		



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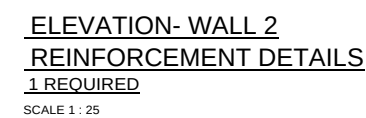
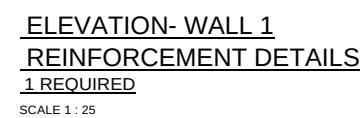


JW14301R: LINBRO WATER UPGRADES
REINFORCEMENT DETAILS- PRESSURE REDUCING BUILDING

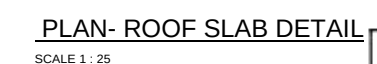
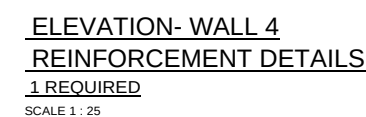
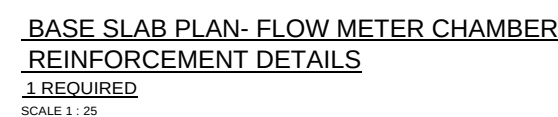
SCALE	REV:	AMENDMENTS	APPROVED DATE:
AS SHOWN	T	ISSUE FOR TENDER	12/07/2024

DRAWING-No. JW14301R-DET33-W01			
JW14301R	DET33	T	
PROJECT No.	DRAWING No.	REV.	
A0	2	2	
ORIGINAL PAGE SIZE FILE No.			

[illegible]



A cross-sectional diagram of a vertical wall assembly. It shows a central vertical channel. On the left and right sides of this channel are vertical bars. Horizontal bars connect these vertical bars across the channel. Clips are shown at the top and bottom of the vertical bars, securing them to the wall. Labels with leader lines point to the CLIPS, HORIZONTAL BARS, VERTICAL BARS, and the WALL.



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SCALE	REV:	AMENDMENTS	APPROVED DATE:	DRAWING-No. JW14301R-DET34-W01		
AS SHOWN	T	ISSUE FOR TENDER	12/07/2024	JW14301R DET34 T		
				PROJECT No. DRAWING No. REV.		
				A0 SHEET 1 OF 1		
				ORIGINAL PAGE SIZE FILE No.		

MEMBER		REINFORCEMENT					BENDING DIMENSIONS FOR SHAPE CODES (SABS 82)						FIXING AND NON STANDARD BENDING DETAILS									
Description	Mark	Type & Size	No. of Mbers	No. of Bars	Total	Cutting Length	Shape code	A	B	C	D	E or r										
BASE SLAB-FLOW METER CHAMBER	01	Y12	1	33	33	4150	55	400	220	3020	220	(400)										
	02	Y12	1	33	33	3225	38	130	3020	(130)												
	03	Y12	1	16	16	5400	37	130	(5300)													
	04	Y12	1	16	16	5850	38	400	195	(5300)												
	06	Y12	1	1	1	3250	55	400	220	2110	220	(400)										
	07	Y12	1	16	16	2350	38	400	195	(1810)												
	08	Y12	1	16	16	1925	37	130	(1810)													
	09	Y12	1	1	1	2325	38	130	2110	(130)												
	11	Y12	1	1	1	1450	38	400	195	(910)												
	12	Y12	1	1	1	1025	37	130	(910)													
	13	Y12	1	4	4	750	38	140	520	(150)												
	14	Y12	1	73	73	1975	38	900	220	(900)												
	15	Y10	1	8	8	1225	83	350	180	300	300											
DETAIL 1	18	Y12	1	9	9	2575	38	1200	220	(1200)												
	26	Y12	1	10	10	1025	38	130	820	(130)												
	27	Y10	1	2	2	1550	60	490	220													
	28	Y10	1	4	4	1625	60	520	220													
	29	Y12	1	5	5	1025	38	130	820	(130)												
	30	Y12	1	5	5	1750	55	300	220	820	220	(300)										
	31	Y12	1	4	4	700	37	590	(130)													
WALL 1	16	Y12	1	10	10	975	37	850	(150)													
Masses (kg)	Size Typ	6	8	10	12	16	20	25	32	40	Total (Kg)	Sheet Title	JW14301R: LINBROWATER UPGRADES				Project No. JW14301R		Schedule No. 1			
	R											Project	JW14301R: LINBROWATER UPGRADES				Ref. Dwg. DET34		Revision Suffix			
	Y			12.0	629.1						641.1	Section	FLOW METER CHAMBER				Date 27/06/2016		Drawn D.G.		Checked S.M.	
	Total (Kg)			12.0	629.1						641.1											

MEMBER		REINFORCEMENT					BENDING DIMENSIONS FOR SHAPE CODES (SABS 82)					FIXING AND NON STANDARD BENDING DETAILS					
Description	Mark	Type & Size	No. of Mbers	No. of Bars	Total	Cutting Length	Shape code	A	B	C	D	E or r					
WALL 1	17	Y12	1	30	30	1950	38	900	195	(900)							
	19	Y12	1	30	30	1800	20										
	35	Y12	1	20	20	2750	20										
	36	Y12	1	10	10	1625	37	850	(800)								
	37	R8	1	4	4	425	85	120	215	50	(85)						
WALL 2	16	Y12	1	10	10	975	37	850	(150)								
	19	Y12	1	30	30	1800	20										
	20	Y12	1	30	30	1950	38	900	195	(900)							
	35	Y12	1	20	20	2750	20										
	36	Y12	1	10	10	1625	37	850	(800)								
WALL 3	16	Y12	1	31	31	975	37	850	(150)								
	20	Y12	1	30	30	1950	38	900	195	(900)							
	21	Y12	1	28	28	5300	20										
	22	Y12	1	4	4	2150	20										
	23	Y12	1	8	8	850	20										
	24	Y12	1	8	8	1650	20										
	25	Y12	1	4	4	900	20										
	35	Y12	1	56	56	2750	20										
	36	Y12	1	31	31	1625	37	850	(800)								
	37	R8	1	18	18	425	85	120	215	50	(85)						
M a s s e s (kg)	Size Typ	6	8	10	12	16	20	25	32	40	Total (Kg)	Sheet Title	JW14301R: LINBRO WATER UPGRADES		Project No. JW14301R	Schedule No.	2
	R		4.3								4.3	Project	JW14301R: LINBRO WATER UPGRADES		Ref. Dwg. DET34	Revision Suffix	
	Y				757.3						757.3	Section	FLOW METER CHAMBER		Date 27/06/2016	Drawn D.G.	Checked S.M.
	Total (kg)		4.3		757.3							761.6					

MEMBER		REINFORCEMENT					BENDING DIMENSIONS FOR SHAPE CODES (SABS 82)					FIXING AND NON STANDARD BENDING DETAILS					
Description	Mark	Type & Size	No. of Mbers	No. of Bars	Total	Cutting Length	Shape code	A	B	C	D	E or r					
WALL 4	16	Y12	1	35	35	975	37	850	(150)								
	20	Y12	1	30	30	1950	38	900	195	(900)							
	21	Y12	1	28	28	5300	20										
	22	Y12	1	4	4	2150	20										
	23	Y12	1	8	8	850	20										
	24	Y12	1	8	8	1650	20										
	25	Y12	1	4	4	900	20										
	35	Y12	1	56	56	2750	20										
	36	Y12	1	30	30	1625	37	850	(800)								
	37	R8	1	18	18	425	85	120	215	50	(85)						
DETAIL 2	33	Y10	4	16	64	1200	20										
	34	Y12	4	16	64	1500	20										
ROOF SLAB-FLOW METER CHAMBER	05	R8	1	7	7	1100	83	350	100	300	300						
	32	Y12	1	16	16	1800	20										
M a s s e s (kg)	Size Typ	6	8	10	12	16	20	25	32	40	Total (Kg)	Sheet Title	JW14301R: LINBRO WATER UPGRADES		Project No. JW14301R	Schedule No. 3	
	R		6.0								6.0	Project	JW14301R: LINBRO WATER UPGRADES		Ref. Dwg. DET34	Revision Suffix	
	Y			47.6	534.7						582.3	Section	FLOW METER CHAMBER		Date 27/06/2016	Drawn D.G. Checked S.M.	
	Total (Kg)		6.0	47.6	534.7						588.3						

ISSUE FOR TENDER ONLY

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DESIGNED	F.M	24/06/2016
DRAWN	D.G	24/06/2016
CHECKED	S.M	24/06/2016
APPROVED BY:	K. MUJAJI	14/02/2019
ECSA REG. No.		
CHECKED		
APPROVED BY:	E. MUDAU	
ECSA REG. No.		



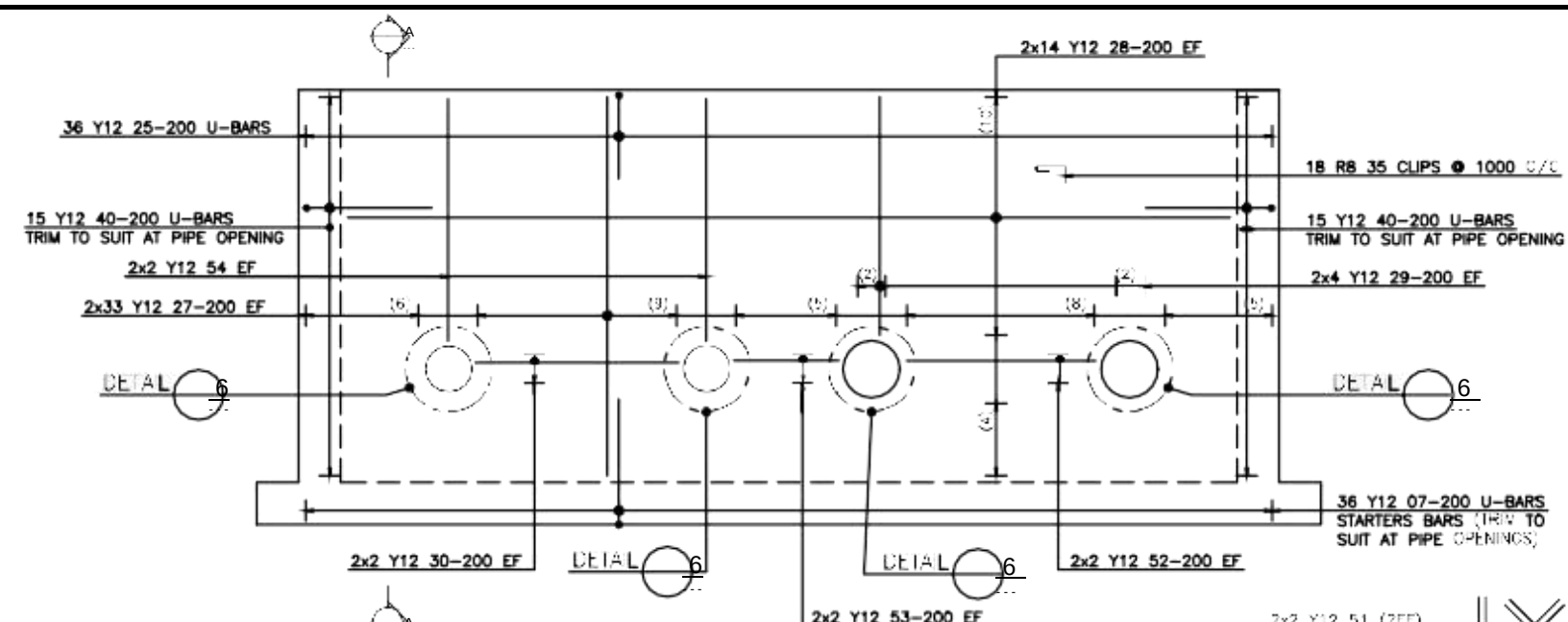
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JW14301R: LINBRO WATER UPGRADES
REINFORCEMENT DETAILS: FLOW METER CHAMBER
BENDING SCHEDULE

SCALE	REV:	AMENDMENTS	APPROVED DATE:
AS SHOWN	T	ISSUE FOR TENDER	12/07/2024

DRAWING-No. JW14301R-DET34A-W01			
ISSUED FOR TENDER			
JW14301R	DET34A	T	
PROJECT No.	DRAWING No.	REV.	
A0	SHEET 1	OF 1	
ORIGINAL PAGE SIZE			
FILE No.			



ELEVATION- WALL 12
REINFORCEMENT DETAILS
1 REQUIRED
SCALE 1 : 25

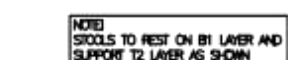
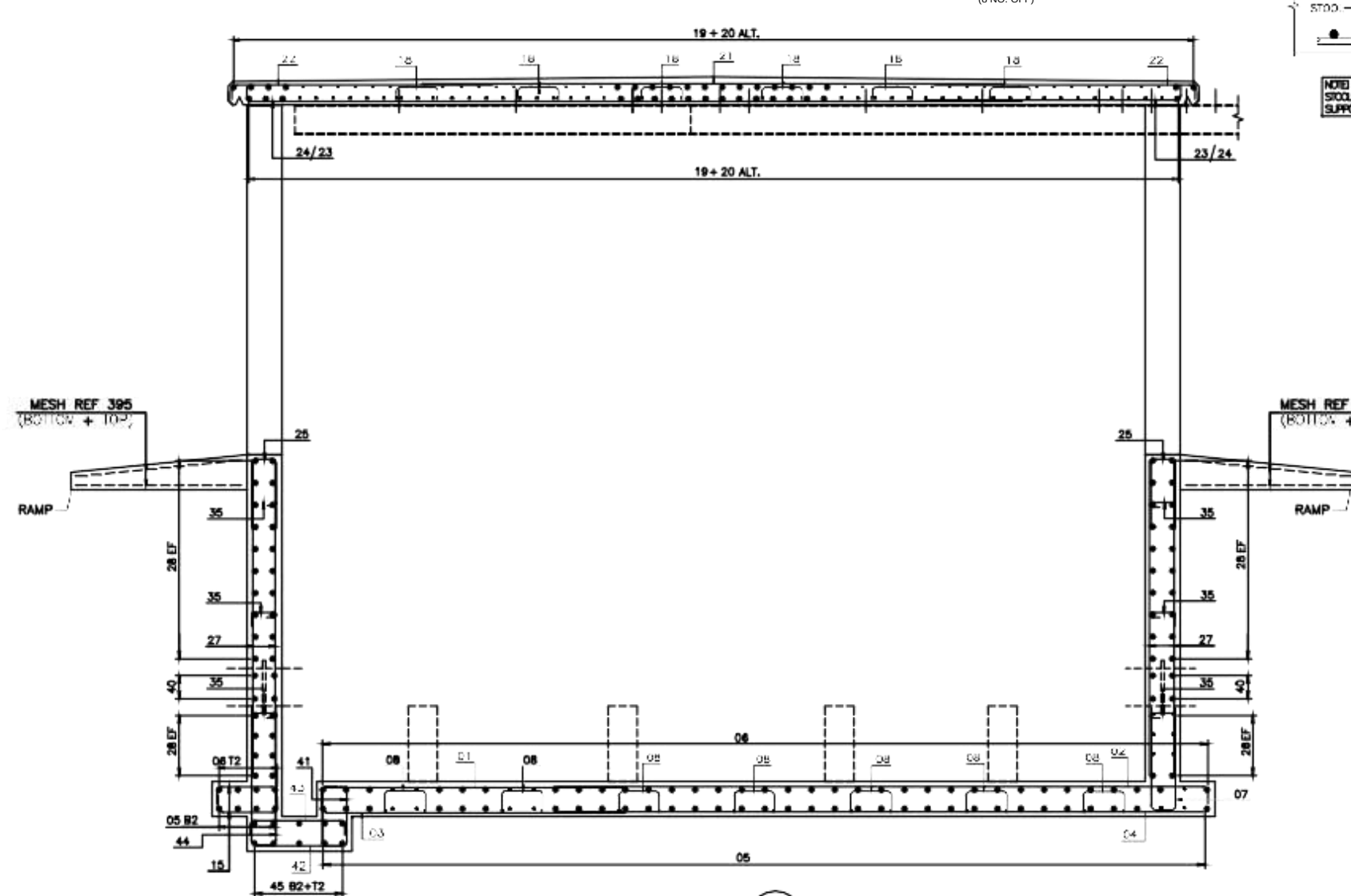
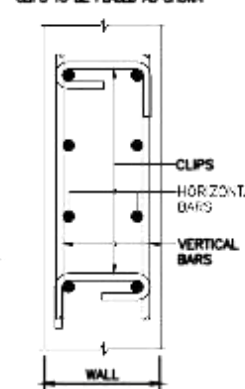


REINFORCING NOTATION:

10 - Y12 - A01 - 250 T1

Diagram illustrating the components of the reinforcing notation:

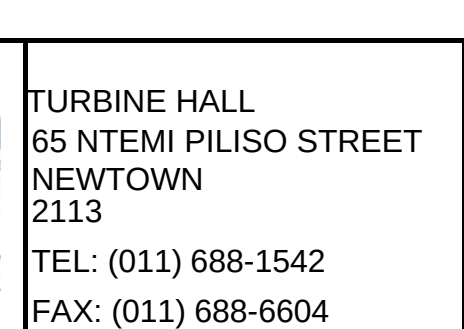
- 10 - Y12 - A01 - 250 T1
- 10 - NUMBER OF BARS
- Y12 - BAR TYPE AND DIAMETER
- A01 - BAR MARK
- 250 - BAR CENTRES
- T1 - BAR PLACEMENT

CLIPS DETAIL
CLIPS TO BE PLACED AS SHOWN

DETAIL 5

SCALE 1 : 25

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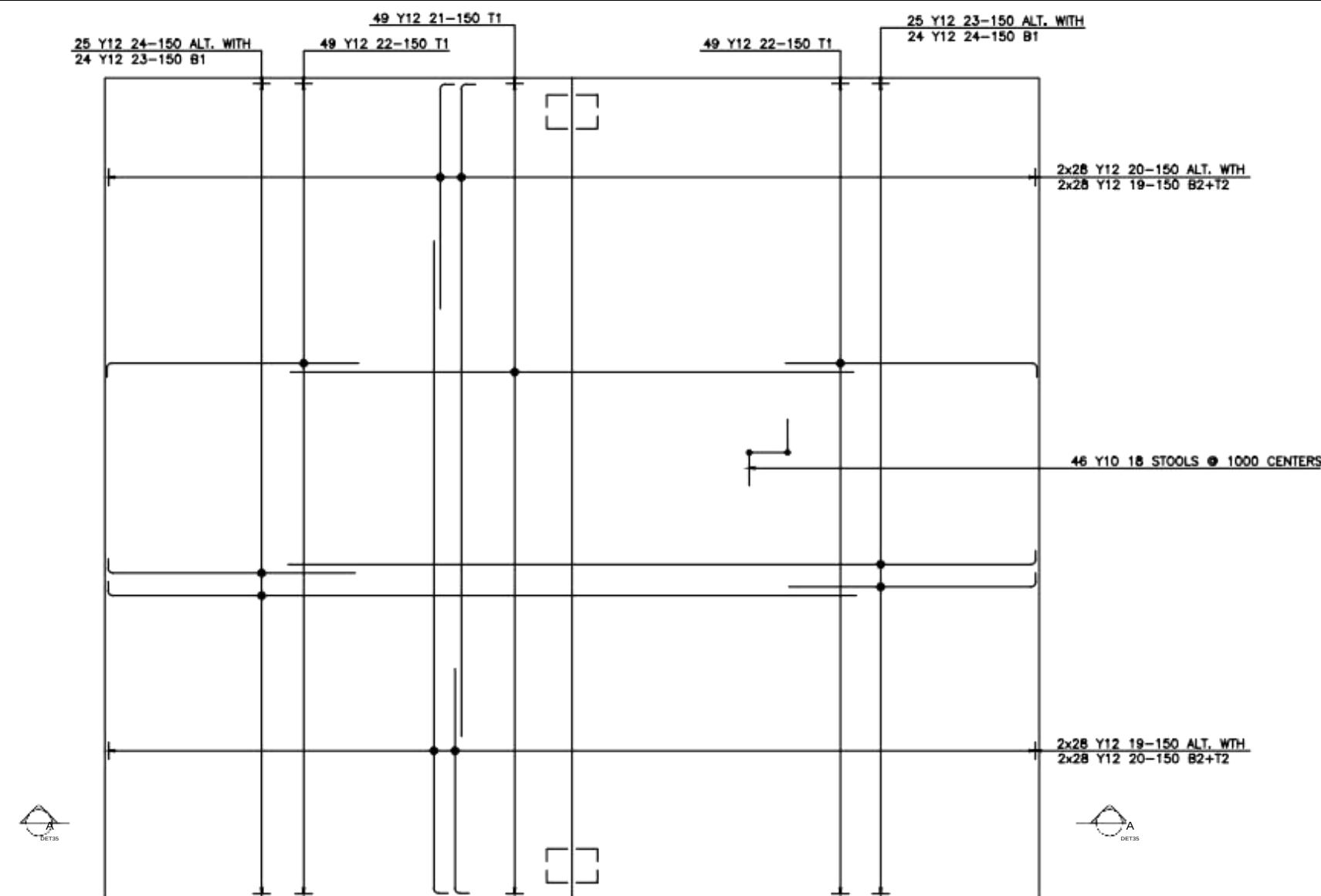


JW14301R: LINBRO WATER UPGRADES

[illegible]

MEMBER		REINFORCEMENT					BENDING DIMENSIONS FOR SHAPE CODES (SAB5 82)							FIXING AND NON STANDARD BENDING DETAILS									
Description		Mark	Type & Size	No. of Mbers	No. of Bars	Total	Cutting Length	Shape code	A	B	C	D	E or r										
DETAIL 5		45	Y12	1	10	10	1025	38	130	800	(130)												
		46	Y10	1	2	2	1550	60	490	220													
WALL 11		25	Y12	1	36	36	1375	38	600	220	(600)												
		27	Y12	1	66	66	2700	20															
		28	Y12	1	28	28	6300	20															
		29	Y12	1	8	8	1700	20															
		30	Y12	1	4	4	1450	20															
		35	R8	1	18	18	425	85	120	215	50	(85)											
		40	Y12	1	30	30	1950	38	900	195	(900)												
		52	Y12	1	4	4	1350	20															
		53	Y12	1	4	4	790	20															
		54	Y12	1	4	4	1725	20															
WALL 12		25	Y12	1	36	36	1375	38	600	220	(600)												
		27	Y12	1	66	66	2700	20															
		28	Y12	1	28	28	6300	20															
		29	Y12	1	8	8	1700	20															
		30	Y12	1	4	4	1450	20															
		35	R8	1	18	18	425	85	120	215	50	(85)											
		40	Y12	1	30	30	1950	38	900	195	(900)												
		52	Y12	1	4	4	1350	20															
		53	Y12	1	4	4	790	20															
M a s s e s (Kg)	Size Typ	6	8	10	12	16	20	25	32	40	Total (Kg)	Sheet Title	JW14301R: LINBRO WATER UPGRADES				Project No. JW14301R		Schedule No. 2				
	"R"		6.0								6.0	Project	RESERVOIR CONTROL VALVE BUILDING				Ref. Dwg. DET350		Revision Suffix				
	"Y"			1.9	888.2						890.1		JW14301R: LINBRO WATER UPGRADES				Date 27/06/2016		Checked				
	Total (Kg)		6.0	1.9	888.2						896.1	Section	RESERVOIR CONTROL VALVE BUILDING				Drawn D.G		S.A				

 MARISWE (Pty)Ltd P.O.Box 25549 Monument Park 0105 TEL: +27 (0) 12 424 9700 FAX: +27 (0) 12 460 4071	DESIGNED	F.M	24/06/2016	 Johannesburg Water	TURBINE HALL 65 NTEMI PILISO STREET NEWTOWN 2113 TEL: (011) 688-1542 FAX: (011) 688-6604	 JW14301R: LINBRO WATER UPGRADES REINFORCEMENT DETAILS- RESERVOIR CONTROL VALVE BUILDING BENDING SCHEDULE				SCALE	REV:	AMENDMENTS	APPROVED DATE:	DRAWING-No. JW14301R-DET35A-W01 ISSUED FOR INFORMATION JW14301R PROJECT No. A0 DET35A DRAWING No. 1 T REV. 1 ORIGINAL PAGE SIZE FILE No.



ROOF SLAB PLAN- RESERVOIR CONTROL VALVE BUILDING
REINFORCEMENT DETAILS
1 REQUIRED
SCALE 1 : 25

NOTES

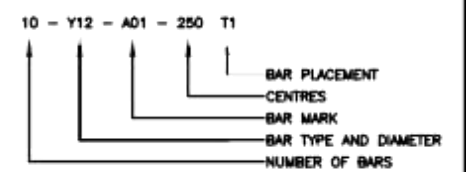
1. REINFORCEMENT TO BE AS SHOWN 2011 AND 2012.
2. REFER TO REINFORCEMENT:
 - BASE SLAB = 40mm
 - WALLS = 40mm
 - COLUMNS = 30mm
 - ROOF SLAB = 30mm

3. MINIMUM LAP LENGTH = 45 x SMALLER BAR DIAMETER.
MINIMUM LAP DIMENSION INDICATED TO BE APPLICABLE.

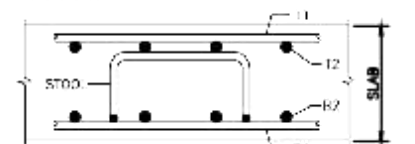
REINFORCING LEGEND:

1. T - TOP
2. M - MIDDLE
3. B - BOTTOM
4. T1 - FIRST TOP LAYER
5. T2 - SECOND TOP LAYER
6. B1 - FIRST BOTTOM LAYER
7. B2 - SECOND BOTTOM LAYER
8. ABR - ALTERNATE BARS REVERSED
9. ALT - ALTERNATING BARS
10. NF - NEAR FACE
11. FF - FAR FACE
12. EF - EACH FACE
13. EW - EACH WAY

REINFORCING NOTATION:



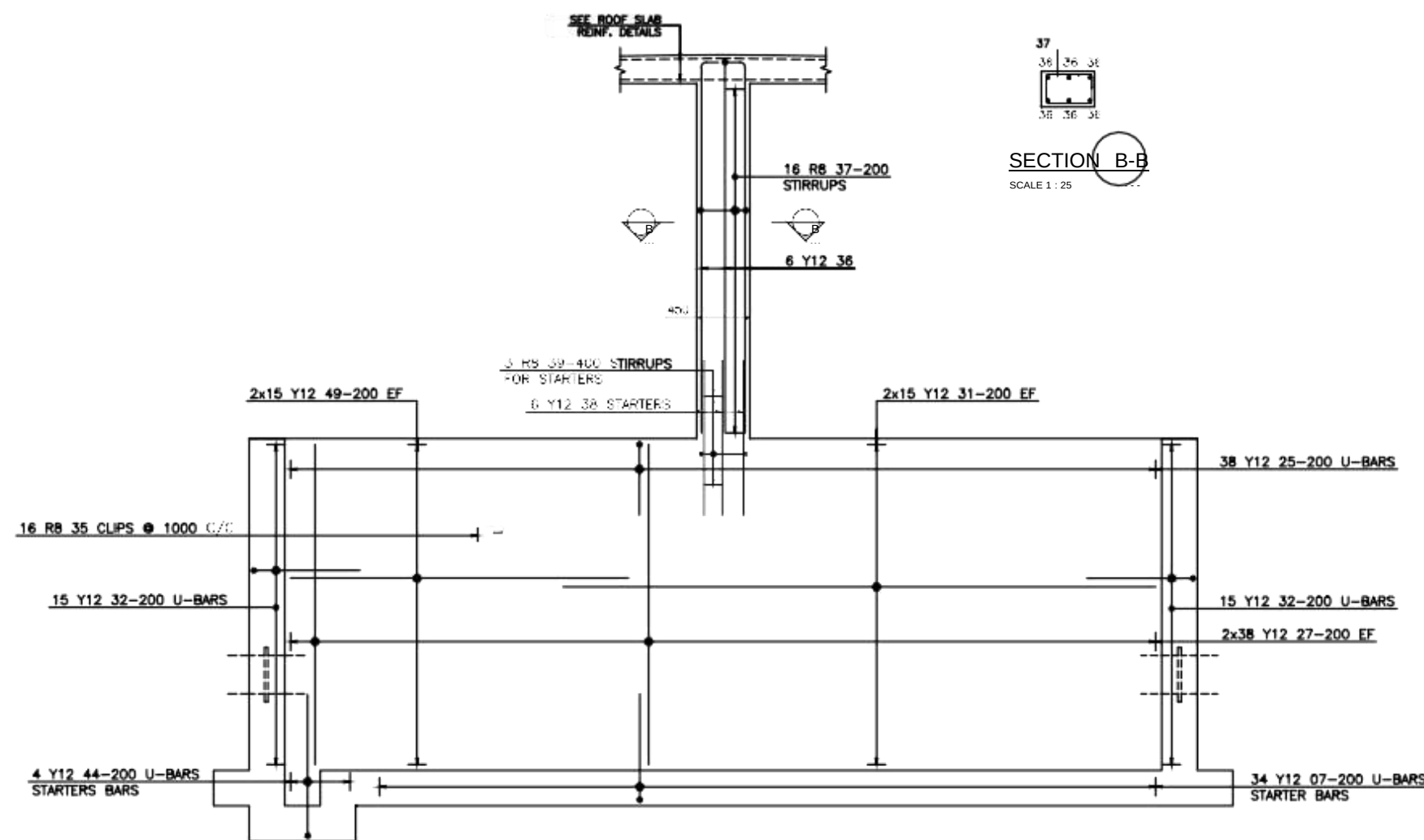
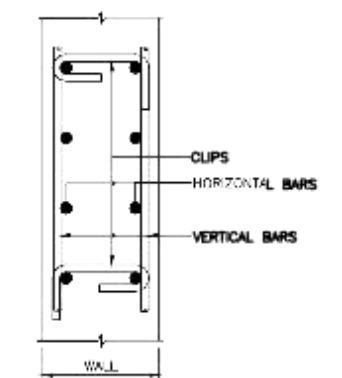
STOOLES



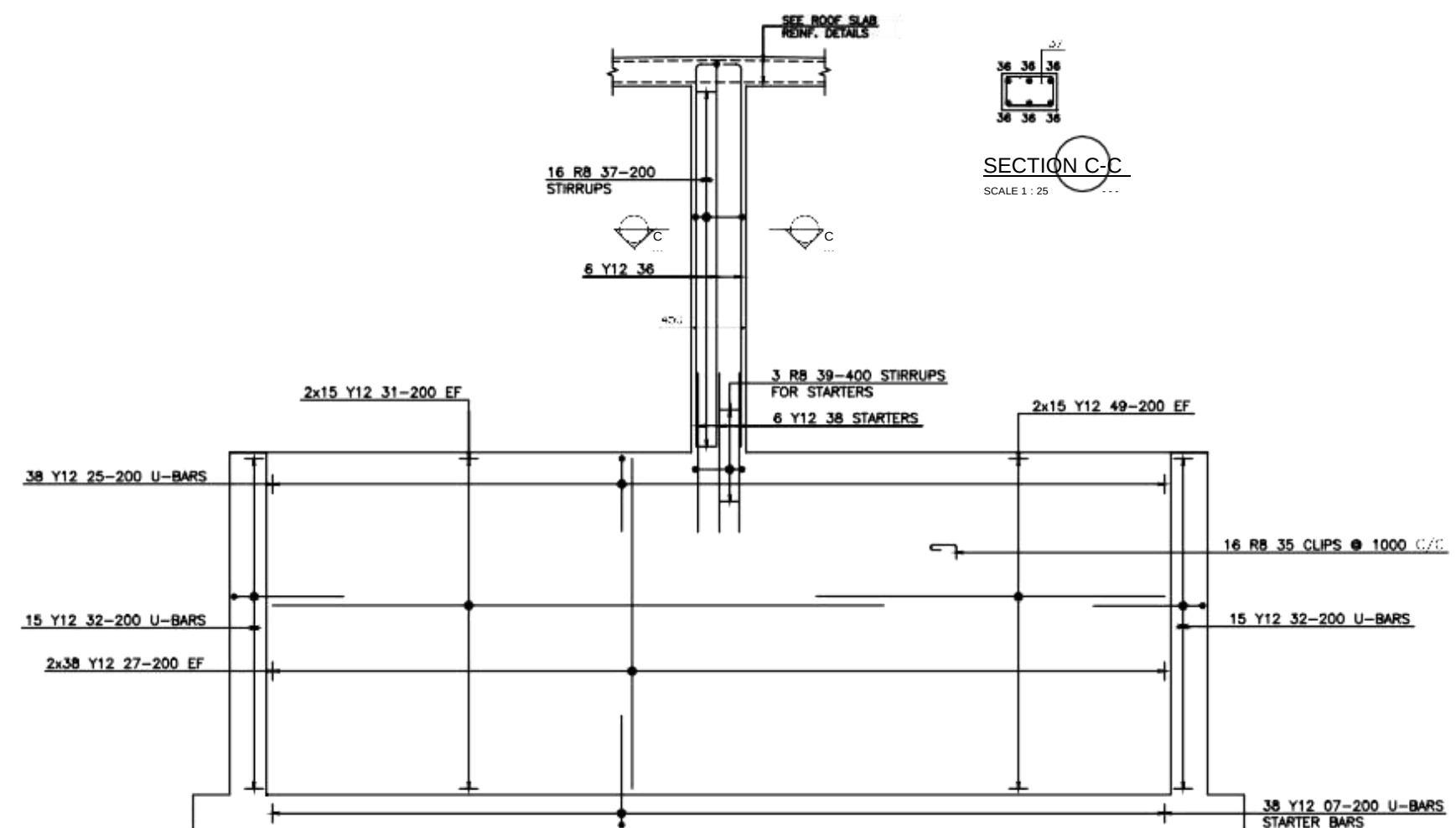
NOTE: STOOLES TO REST ON B1 LAYER AND SUPPORT T2 LAYER AS SHOWN

CLIPS DETAIL

CLIPS TO BE PLACED AS SHOWN



ELEVATION- WALL 9 AND COLUMN C3 (300 x 450)
REINFORCEMENT DETAILS
1 REQUIRED
SCALE 1 : 25



ELEVATION- WALL 10 AND COLUMN C4 (300 x 450)
REINFORCEMENT DETAILS
1 REQUIRED
SCALE 1 : 25

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