



TENDER COVER PAGE



MBD 1

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF JOHANNESBURG WATER

BID NUMBER: JW14471

CLOSING DATE: 20 JUNE 2025

CLOSING TIME: 10:30 AM

DESCRIPTION: RENOVATIONS AT NORTHERN WORKS AND FLOW LABORATORY

CIDB REQUIREMENTS: TENDERERS SHOULD HAVE A CONTRACTOR CIDB GRADING OF 6GB OR HIGHER

| | |
|---------------------------|--|
| BRIEFING SESSION | COMPULSORY YES |
| BRIEFING DETAILS | <p>DATE AND TIME : 21 MAY 2025 AT 13:00</p> <p>ADDRESS : ROBINSON 82 - IR, JOHANNESBURG, 2001</p> <p>VENUE : JOHANNESBURG WATER FFENNELL DEPOT</p> <p>TENDERS RECEIVED FROM NON-ATTENDED BIDDERS OF A COMPULSORY BRIEFING SESSION WILL BE DISQUALIFIED</p> <p><i>Note:</i> <i>For offsite briefing attendees to ensure that transport used is capable to access the gravel road for site viewing.</i></p> |
| TENDER SUBMISSION DETAILS | <p>BID DOCUMENTS MUST BE DEPOSITED IN THE TENDER BOX SITUATED AT GROUND FLOOR IN JOHANNESBURG WATER</p> <p>ADDRESS: TURBINE HALL, 65 NTEMI PILISO STREET, NEWTOWN, JOHANNESBURG, 2001</p> <p>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.</p> <p>TIMES: THE BUILDING WILL OPEN 7 DAYS A WEEK FROM 06:00 UNTIL 18:00</p> |

BIDDER INFORMATION

| | | | |
|----------------------------|-----------------------|--|---------------|
| NAME OF BIDDER | | | |
| NO. OF DOCUMENTS SUBMITTED | | | |
| 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 (CRS) No |

EMPLOYER INFORMATION

| | | | |
|------------------|--|------------------|--|
| DEPARTMENT | PMU | DEPARTMENT | SCM |
| CONTACT PERSON | MUHAMMAD MALIK | CONTACT PERSON | GCINA NDELA |
| TELEPHONE NUMBER | 011 688 6583 | TELEPHONE NUMBER | 011 688 1796 |
| E-MAIL ADDRESS | muhammad.malik@jwater.co.za | E-MAIL ADDRESS | gcina.ndela@jwater.co.za |



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**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.



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

WITHOUT LIMITATION, JOHANNESBURG WATER TAKES NO RESPONSIBILITY FOR ANY DELAYS IN ANY COURIER OR POSTAL SYSTEM OR ANY LOGISTICAL DELAYS WITHIN THE PREMISES OF JOHANNESBURG WATER. JOHANNESBURG WATER LIKewise TAKES NO RESPONSIBILITY FOR OFFERS DELIVERED TO A LOCATION OTHER THAN THE TENDER BOX AS PER THE TENDER SUBMISSION DETAILS STATED IN THE TENDER DOCUMENT. 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 Johannesburg Water Supply Chain Management policy at time of tender advert is applicable to this tender and 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 (ALSO PROVIDE AN ELECTRONIC COPY IN A MEMORY STICK/USB).

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:



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. JW14471: RENOVATIONS AT NORTHERN WORKS LABORATORY AND FLOW LABORATORY

The tender document will be available in the form of a download from the Johannesburg Water website (www.johannesburgwater.co.za/supply_chain/tenders) starting from 14 May 2025.

The Employer is Johannesburg Water

All tenders and supporting documents must be submitted in a sealed envelope and be placed in the Tender box on the ground floor of the Johannesburg Water by no later than 10:30 am 20 June 2025.

Address is as follows:

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

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

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

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



Contract JW 14471
 Description : RENOVATIONS AT NORTHERN WORKS LABORATORY
 AND FLOW LABORATORY
 Volume 1 Tender and Contract
 Section T1 Tender and Contract



Johannesburg Water SOC Ltd



CONTRACT NO: JW14471

**RENOVATIONS AT NORTHERN WORKS LABORATORY
 AND FLOW LABORATORY**

VOLUME 1

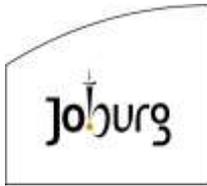
TENDER AND CONTRACT

Prepared by
 PMU
 PO Box 61542
 Marshalltown
 2107

V2.0



| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



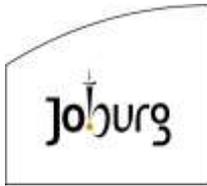
The Tenderer is to indicate in the “Submitted (Yes/No)” column in the below table that they have completed the required section of the tender document. Completion of this checklist will assist the Tenderer in ensuring that they have attended to all the required items for submission with this tender. Additionally, it is an absolute requirement that tenderers comply with National Treasury’s CSD registration as well as SARS tax compliance requirements for contract award – refer T2.2.2. The below will form part of the tender document, the tenderers are therefore encouraged to submit the returnable and or documentation with their tender offer to avoid elimination especially with regards to what is stated in the Required for Tender Evaluation column or not obtaining points for Specific Goals. Tenderers are encouraged to ensure that their Tax status remains Tax Compliant on CSD throughout the process to avoid delaying the process or being eliminated at award stage. For infrastructure related projects. Tenderer must have 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

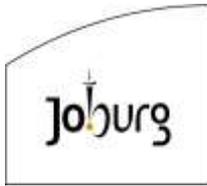
| Ref | Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer | Required for Tender Evaluation | Required for Tender Award | Required After Tender Award | Submitted (Yes/No) |
|-----------------------------------|--|---|---------------------------|-----------------------------|--------------------|
| 1. | Tender Cover: | | | | |
| | Name of Tender | • | | | |
| | Contact Person | • | | | |
| | Telephone Number | • | | | |
| | Central Supplier Database Registration | • | • | | |
| | CIDB Registration Number, minimum required CIDB grading for the tender and Active Status – if applicable | • | | | |
| | COIDA Registration Number | | | • | |
| | Tax SARS PIN No. | • | • | | |
| MAAA No. for Tax Compliant Status | • | • | | | |
| 2. | Mandatory Documents at Particular Stage: | | | | |
| | CIDB grading of 8GB 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. T2.1 | Administrative Documentation: | | | | |
| | 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. | • | | |
| T2.2.4 | MBD 8 - Bidder's past supply chain management | • | • | | |

| | | | |
|-----------|--|-------------|--|
| 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) |
|--------|--|--------------------------------|---------------------------|-----------------------------|--------------------|
| | practices – Completed and signed. | | | | |
| T2.2.4 | MBD 9 - Certificate of Independent Bid Determination – Completed and signed. | • | • | | |
| | Municipal Rates and Taxes for the Tenderer - Current municipal rates for the 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 documents. | • | • | | |
| | 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 documents. | • | • | | |
| | 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 qualification 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 / Approval Certificates) | • | | | |
| | Documentary Evidence Required for Criteria 2 – (CV, qualifications, and valid registration) | • | | | |
| | Documentary Evidence Required for Criteria 3 – (CV, qualifications, and valid registration) | • | | | |
| | Documentary Evidence Required for Criteria 4 – (CV, qualifications, and valid registration) | • | | | |

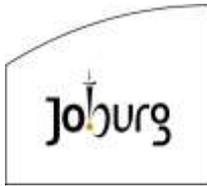
| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



| 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) |
|--|---|--------------------------------|---------------------------|-----------------------------|--------------------|
| 5. | Specific Goals: | | | | |
| | Documentary Evidence Required for Criteria 1 – Valid BBBEE Certificate issued by SANAS accredited verification agency 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: | | | | |
| | Pricing Schedule/ Bill of Quantities completed in accordance with the award strategy | • | | | |
| 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 | • | | | |
| 12. | Pricing Data | • | • | | |
| | 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 Occupation Injuries and Diseases Act | | | • | |
| Performance Security – where applicable for industrial related services | | | • | | |
| Resolution Letter for the Subcontractor (a letter authorizing the person completing the tender to sign on behalf of the company) – if applicable | | | • | | |
| Comprehensive Health and Safety Plan (compliance with OHSE Specification - if applicable) | | | • | | |

Tenderers will be notified of such missing and incomplete 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 documents that require completion and signatures that do not have a bearing on functionality, price and preference points for specific goals.

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Contract No JW 14471
Description RENOVATIONS AT NORTHERN WORKS LABORATORY
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Volume 1 Tender and Contract
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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: | |



Contract No JW 14471

RENOVATIONS AT NORTHERN WORKS LABORATORY
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Johannesburg Water (SOC) Ltd



CONTRACT NO. JW14471

**RENOVATIONS AT NORTHERN WORKS
LABORATORY AND FLOW LABORATORY**

VOLUME 1

TENDERING PROCEDURES



Contract No JW 14471

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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.

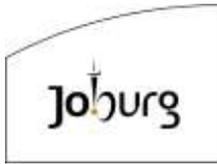
The additional Conditions of Tender are:

| Clause number | Tender Data |
|---------------|--|
| C.1.1 | The Employer is, Johannesburg Water (SOC) Limited |
| C.1.2 | <p>The tender documents issued by the Employer comprise:</p> <p>Volume 1:</p> <p>Part 1: Tendering Procedures</p> <p>T1.1 Tender Notice and Invitation to Tender</p> <p>T1.2 Tender Data</p> <p>Part 2: Returnable Documents</p> <p>T2.1 List of Returnable Documents</p> <p>T2.2 Returnable Schedules, including the Enterprise Declaration Affidavit which may be bound in a separate volume</p> <p>Volume 1:</p> <p>Part 1: Agreement and Contract Data</p> <p>C1.1 Form of Offer and Acceptance</p> <p>C1.2 Contract Data</p> <p>C1.3 Forms of Securities</p> <p>Part 2: Pricing Data</p> <p>C2.1 Pricing Instructions</p> <p>C2.2 Schedule of Rates</p> <p>Volume 2A</p> <p>Part 3: Scope of Work</p> <p>C3.1 Scope of Work</p> <p>C3.2 Particular Specifications</p> <p>Part 4: Site Information</p> <p>C4 Site Information</p> <p>Volumes 2B:</p> <p>Generic Specifications</p> <p>Volume 3:</p> <p>Occupational Health, Safety and Environmental Specification and Environmental Management Plan</p> <p>Volume 4:</p> <p>Tender Drawings</p> |



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| Clause number | Tender Data |
|---------------|--|
| C.1.4 | <p>The Employer's representative is: Contact Person: Muhammad Malik Telephone: 011 688 6583 E-mail address: Muhammad.malik@jwater.co.za</p> <p>The SCM representative is: Contact Person: Gcina Ndela Telephone: 011 688 1796 E-mail address: gcina.ndela@jwater.co.za</p> |
| C.2.1 | <p>Eligibility criteria and requirements CIDB registration and grading:</p> <ol style="list-style-type: none"> 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 6GB 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: <ol style="list-style-type: none"> 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 6GB class of construction work. <p>Failure to meet to Eligibility criteria and requirements will result in disqualification.</p> |
| C.2.8 | <p>Replace the contents of the clause with the following:</p> <p>“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”</p> |
| C.2.9 | <p>Add the following to the clause:</p> <p>“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.”</p> |
| C.2.10.5 | <p>Add the following to the clause:</p> <p>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.</p> |



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| Clause number | Tender Data |
|---------------|--|
| C.2.11 | <p>The evaluation on price alteration will be conducted as follows:</p> <p>Where the tender award strategy is to evaluate and award per item or category, the following must apply:</p> <ul style="list-style-type: none"> • 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 • 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. <p>Where the tender award strategy is to evaluate and award total bid offer, the following must apply:</p> <ol style="list-style-type: none"> 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. <p>Where the tender pricing schedule or bill of quantities is requesting rates/price from bidder/s without providing a total, the following will apply:</p> <ol style="list-style-type: none"> (i) If there is an unauthenticated alteration on the unit rate/price the bidder will be disqualified. <p>Corrections may not be made using correction fluid, correction tape or the like, bid received contrary to this will be disqualified.</p> |
| C.2.12.1 | <p>Replace Contents</p> <p>Alternative offers will not be permitted.</p> |
| C.2.12.2 | <p>Failure to complete bid amount on the form of offer and sign full will result in the elimination of the tender.</p> |
| C.2.13.3 | <p>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)</p> |
| C.2.13.5 | <p>The Employer's address for delivery of tender offers and identification details to be shown on the Tenderer's offer package are:</p> <p>Location of tender box: Ground Floor Entrance</p> <p>Physical address: Johannesburg Water (SOC) Ltd Turbine Hall 65 Ntemi Piliso Street Newtown Johannesburg 2001</p> <p>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></p> |



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| Clause number | Tender Data |
|---------------|---|
| 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 90 days. |
| C.2.16.1 | <p>Add the following to the clause:</p> <p>“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.”</p> |
| C.2.23 | <p>The Tenderer is required to submit with his tender:</p> <ol style="list-style-type: none"> 1) Valid SARS Compliance status Pin for Tenders issued by the South African Revenue Services. 2) Proof of CSD registration i.e. MAnumber 3) A Certificate of Contractor Registration issued by the CIDB. 4) where the tendered amount inclusive of VAT exceeds R 10 million: <ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> 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. |



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| | 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 | <p>Add the following new clause:</p> <p>Canvassing and obtaining of additional information by tenderers Accept that no Tenderer shall make any attempt either directly or indirectly to canvass any of the Employers officials or the Principal Agent in respect of his tender, after the opening of the tenders but prior to the Employer arriving at a decision thereon. No Tenderer shall make any attempt to obtain particulars of any relevant information, other than that disclosed at the opening of tenders.</p> |
| C.2.25 | <p>Add the following new clause:</p> <p>Prohibitions on awards to persons in service of the state Accept that the Employer is prohibited to award a tender to a person -</p> <ul style="list-style-type: none"> 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. <p>“In the service of the state” means to be -</p> <ul style="list-style-type: none"> i) a member of: - <ul style="list-style-type: none"> • 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.” <p>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.</p> |
| C.2.26 | <p>Add the following new clause:</p> <p>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</p> <ul style="list-style-type: none"> 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. |



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| | To give effect to the above, the questionnaire for the declaration of interests in the tender of persons in service of state in part T2 – Returnable Documents must be completed in full and signed. |
| C.2.27 | Add the following new clause: Tax Compliance In the case of a Joint Venture/Consortium the tax Compliance status Pin must be submitted for each member of the Joint Venture/Consortium.” |
| C.2.28 | Add the following new clause: i) Tenderers will be notified of any omitted, outstanding, missing and or incomplete administrative documents and will be offered a period of 3 days to complete or submit those pages i.e., Municipal Bidding Documents (MBD), authority to sign and other administrative documents that require completion and signatures. These exclude documentation on functionality, price and preference points for specific goals. ii) Tenders that are received contrary to the above requirements will be disqualified after three (3) days period has lapsed. iii) In cases where locality is a specific goal and the bidder did not submit the required documentation, the tenderer upon submitting the municipal statement, lease agreement or letter from ward councilor confirming business address as per above, may not be eligible for points under specific goals if such documentation was not submitted with the tender document. |
| C.3.2 | Replace the contents of the clause with the following: If necessary, issue addenda that may amend or amplify the tender documents to each tenderer during the period from the date that tender documents are available until seven (7) calendar days before the tender closing time stated in the Tender Data. If, as a result a tenderer applies for an extension to the closing time stated in the Tender Data, the Employer may grant such extension and, shall then notify all tenderers who collected tender documents. |
| C.3.4.2 | Tenders will be opened in public soon after closing time and recording of received documents but not later than 11:00 at the tender office located at Turbine Hall, 65 Ntemi Piliso, Newtown, 2001, Ground Floor. Tenderers’ names and total prices, where practical will be, read out |



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| | |
|-------|---|
| C.3.9 | <p>Replace Existing Clause</p> <p>Arithmetic Errors</p> <p>Construction related tenders</p> <p>JW undertakes to check the highest scoring bid for arithmetical errors and correcting them as follows:</p> <p>JW shall check for arithmetic errors using the following sequence:</p> <ul style="list-style-type: none">(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. <p>If a bill of quantities or price schedule applies JW will request the bidder to correct the arithmetic errors as follows:</p> <ul style="list-style-type: none">(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. <p>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:</p> <ul style="list-style-type: none">(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. <p>Clarification session(s) shall be held with Tenderer where there is pricing discrepancies, errors are highlighted and identified corrections are explained.</p> <p>Tenderer is afforded an opportunity to provide clarification, accept or reject identified corrections in writing.</p> <ul style="list-style-type: none">(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. <p>This is not an opportunity for Tenderers to change the bid offer. A bidder that does not agree to the above will be disqualified.</p> |
|-------|---|



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| | <p>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.</p> <p>Should the tenderer not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in the 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.</p> | | | | | | | | | | |
| C.3.11 | <p>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.</p> <table border="1" data-bbox="405 797 1485 1151"> <thead> <tr> <th data-bbox="405 797 868 864">STAGE</th> <th data-bbox="873 797 1485 864">DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td data-bbox="405 871 868 927">Stage 1</td> <td data-bbox="873 871 1485 927">Mandatory Evaluation</td> </tr> <tr> <td data-bbox="405 934 868 990">Stage 2</td> <td data-bbox="873 934 1485 990">Administrative Evaluation</td> </tr> <tr> <td data-bbox="405 996 868 1052">Stage 3</td> <td data-bbox="873 996 1485 1052">Technical Evaluation</td> </tr> <tr> <td data-bbox="405 1059 868 1151">Stage 4</td> <td data-bbox="873 1059 1485 1151">Preferential Procurement Goals and Pricing Evaluation</td> </tr> </tbody> </table> | STAGE | DESCRIPTION | Stage 1 | Mandatory Evaluation | Stage 2 | Administrative Evaluation | Stage 3 | Technical Evaluation | Stage 4 | Preferential Procurement Goals and Pricing Evaluation |
| STAGE | DESCRIPTION | | | | | | | | | | |
| Stage 1 | Mandatory Evaluation | | | | | | | | | | |
| Stage 2 | Administrative Evaluation | | | | | | | | | | |
| Stage 3 | Technical Evaluation | | | | | | | | | | |
| Stage 4 | Preferential Procurement Goals and Pricing Evaluation | | | | | | | | | | |



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Stage 1: Mandatory Requirement

| Description | | Complied | |
|-------------|--|----------|----|
| No | Description | Yes | No |
| 1 | CIBD grading 6GB or higher. Active Status at the required CIDB 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.

Stage2: Administrative Evaluation

| 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 | | |



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|---|--|--|-----------------|-----------|
| 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 | | |
| Description | | | Complied | |
| Reference | Description | Requirement | Yes | No |
| Annexure – Proof of Specific Goals | Valid Construction Sector BBBEE Certificate issued by SANAS accredited verification agency 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 – Proof of Specific Goals | Valid Construction Sector BBBEE Certificate issued by SANAS accredited verification agency 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 – Proof of Specific Goals | Proof of municipal account / valid lease agreement, letter from the Ward Council confirming the business address | Submit applicable documentation with the tender submission | | |



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| | | | | |
|--|---|--|------------|-----------------|
| 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 | | |
| Description | | | | Complied |
| Reference | Description | Requirement | Yes | No |
| Annexure | Municipal statement of account for Director/s (not older than three (03) months from the closing date of tender or a valid lease agreement at time of tender closure) | Submit applicable documentation with the tender submission | | |
| Annexure | 3-year financial statements (audited where applicable) | Submit applicable documentation with the tender submission | | |
| Annexure | Joint Venture Consortium or equivalent Agreement signed by all parties, where applicable | Where applicable, submit applicable documentation with the tender submission | | |
| <p>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.</p> <p>Tenders that are received contrary to the above requirements will be disqualified after three (3) days period has lapsed.</p> <p>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.</p> | | | | |



STAGE 3: TECHNICAL REQUIREMENTS

Technical evaluation - as per tender document and award strategy.

The following aspects will be considered during the Technical Evaluation:

| CRITERIA NO # | CRITERIA | EVIDENCE | SUB-CRITERIA/CLAUSE | | MAX SCORE | SCORE |
|---------------|--|--|---|------------------------------|-----------|-----------|
| 1 | Tenderers Experience with Respect to Building Construction projects. | Supporting Documents Required include Contactable Reference Letters as per T2.1.7 (Or on Client Letter Head with all required Information) and Works Completion / Certificate of Completion / Certificate of Final Completion / Final Approval Certificate. Note: <i>This reference letter must be completed by the referee/previous client of the tenderer and included in the tender submission. Alternatively, the Client's letterhead may be used provided it complies with all functional requirements. A separate form must be completed for each reference as a requirement 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 tenders. Additionally, we reserve the right to request further information, such as final architectural drawings, or to conduct site visits if deemed necessary to verify the accuracy of the submitted details.</i> | NUMBER OF COMPLETED BUILDING CONSTRUCTION PROJECTS WITH MINIMUM CONSTRUCTION VALUE OF R6 MILLION PER PROJECT | 0 Completed Projects | 40 | 0 |
| | | | | 1 – 2 Completed Project | | 20 |
| | | | | 3 - 4 Completed Projects | | 28 |
| | | | | 5 or more Completed Projects | | 40 |



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| NO # | CRITERIA | EVIDENCE | SUB-CRITERIA/CLAUSE | MAX SCORE | SCORE |
|------|---|--|--|-----------|-------|
| 2 | <p>Post Qualification Experience of Contract Manager</p> <p>Only a Contract Manager with minimum qualification of BTech / BSc/ BEng: Engineering (Civil) or Project Management or Quantity Survey or Construction Management</p> <p>AND</p> <p>ECSA Professional Registration (Pr. Eng. / Pr. Technologist) or SACPCMP Professional Registration (PrCPM / PrCM) 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.</p> | <p>Tender must Provide CV of Contract Manager in the format given on T2.1.9 Note: <i>Tenderers may provide their own CVs but information provided should contain all information in T2.1.9</i> Note: <i>Certified Copies of qualifications and a valid registration certificate to accompany the CVs. 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></p> | <p>NUMBER OF COMPLETED BUILDING CONSTRUCTION PROJECTS AS CONTRACT MANAGER WITH A VALUE OF R6 MILLION OR MORE.</p> <p>0 Completed Projects</p> | 20 | 0 |
| | | | <p>1 – 2 Completed Projects</p> | | 10 |
| | | | <p>3 – 4 Completed Projects</p> | | 14 |
| | | | <p>More than 5 Completed Projects</p> | | 20 |



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| NO # | CRITERIA | EVIDENCE | SUB-CRITERIA/CLAUSE | | MAX SCORE | SCORE |
|------|--|--|--|--------------------------------|-----------|-------|
| 3 | <p>Post Qualification Experience of Site Agent</p> <p>Only a Site Agent with qualifications of National Diploma in Civil Engineering / Building Science or higher AND Registered as a Candidate Engineering Technologist/Candidate Construction Project Manager/Candidate Construction Manager or Higher.</p> | <p>Tender must Provide CV of Site Agent in the format given on T2.1.9</p> <p><i>Note: Tenderers may provide their own CVs but information provided should contain all information in T2.1.9</i></p> <p><i>Note: Certified Copies of qualifications and a valid registration certificate to accompany the CVs. 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></p> | <p>NUMBER OF COMPLETED BUILDING CONSTRUCTION PROJECTS AS SITE AGENT WITH VALUE EXCEEDING R 6 MILLION.</p> | 0 Completed Projects | 25 | 0 |
| | | | | 1 – 2 Completed Projects | | 13 |
| | | | | 3 – 4 Completed Projects | | 18 |
| | | | | More than 5 Completed Projects | | 25 |



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| | | | | | | |
|--|--|--|--|--|--|------------|
| | <p>Sector will obtain a score for experience of a Safety Officer.</p> <p>However, the time of registration of Safety Officer will not impact post qualification number of projects.</p> | | | | | |
| Minimum Acceptable Score | | | | | | 70 |
| Maximum Possible Score | | | | | | 100 |
| <p><i>*Tenderers who FAIL to meet the technical criteria or requirements of tender will be disqualified. Only certified copies of the information originally submitted will be accepted.</i></p> | | | | | | |
| <p>NOTE 1: Where applicable, foreign qualifications MUST be accompanied by a SAQA verification certificate. Failure to submit SAQA verification certificate will lead to that qualification not being considered for allocation of points for that criterion.</p> | | | | | | |
| <p>NOTE 2: When an uncertified copy of professional registration is submitted and the requirement was to submit a certified copy, JW will verify the validity of the registration on the issuing bodies or institution's website. If the verification is confirmed on the website, the bidder meets the criteria. This will only be applicable for the recommended bidders.</p> | | | | | | |
| <p>SACPCMP: South African Council for the Project and Construction Management Professions</p> | | | | | | |
| <p>SAMTRAC: Safety Management Training Course</p> | | | | | | |
| <p>NEBOSH: National Examination Board in Occupational Safety and Health</p> | | | | | | |
| <p>SHEOMTRAC: Safety Health Environmental Occupational Management Training Course</p> | | | | | | |
| <p>SHEMTRAC: Safety Health Environmental Management Training Course</p> | | | | | | |
| <p>MESHTRAC: Management Environmental Safety Health Training Course</p> | | | | | | |
| <p>Tenderers who FAIL to meet the minimum required score or requirements of tender will be disqualified.</p> | | | | | | |



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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

The following preference point systems are applicable to all bids:

- 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).
- If unclear, any preference points scoring may be included and the lowest acceptable tender will be used to determine the preference points to be used for the evaluation. Where the lowest acceptable tender is below R50 million, the 80/20 preference point system must be used and if the lowest acceptable tender is above R50 million, the 90/10 preference point system must be used.
- 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 BEC 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 not to exceed R50 000 000 (all applicable taxes included) and therefore the 80/20 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:

| DESCRIPTION | POINTS |
|--|------------|
| PRICE | 80 |
| SPECIFIC GOALS | 20 |
| Total points for Price and Specific Goals must not exceed | 100 |

(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



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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. 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.

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.



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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:

| The specific goals allocated points in terms of this tender | Number of points allocated (80/20 system) |
|---|---|
| Businesses located within the boundaries of COJ | 10 |
| Business owned by 51% or more- Black Youth | 10 |
| Total | 20 |



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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 | <ul style="list-style-type: none"> Valid BBBEE Certificate issued by SANAS accredited verification agency 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 | Proof of municipal account / valid lease agreement, letter from the Ward Council confirming the business address. |

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:

| Affidavit Prescribed Formats | Category | Financial Threshold |
|---|----------------|-----------------------|
| Generic Enterprises | | |
| | BO QSE | Between R10m and R50m |
| | BO EME | Less than R10m |
| Sector Specific Enterprises | | |
| | BO QSE | Between R10m and R50m |
| | BO EME | Less than R10m |
| Construction Sector Code | | |
| | EME Contractor | Less than R3m |
| | BO EME BEP | Less than R1.8m |
| Financial Sector Code | | |
| | BO QSE | Between R10m and R50m |
| | BO EME | Less than R10m |
| Information Communication Technology Sector Code (ICT) | | |
| | BO QSE | Between R10m and R50m |
| | BO EME | Less than R10m |
| Marketing, Advertising & Communication Sector Code (MAC) | | |
| > Public Relations | BO QSE | Between R5m and R10m |
| > Marketing, Advertising & Communications | BO EME | Less than R5m |
| Property Sector Code | | |
| > Service-based | BO QSE | Between R5m and R10m |
| | EME | Less than R5m |



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| | | |
|--------------------------------|--------|------------------------|
| > Agency-based | BO QSE | Between R2.5m and R35m |
| > Asset-based | EME | Less than R2.5m |
| | BO QSE | Between R80m and R400m |
| Tourism Sector Code | | |
| | BO QSE | Between R5m and R45m |
| | BO EME | Less than R5m |
| Specialised Enterprises | | |
| | BO QSE | Between R10m and R50m |
| | BO EME | Less than R10m |

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.
- b) Bidders who do NOT qualify as EME's and QSE's as outlined above must submit B-BBEE verification certificates that are issued by an Agency accredited by SANAS.
- c) Bidders who fail to submit a certified copy of their valid B-BBEE certificate or valid sworn affidavit 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.



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| | |
|-----------------|---|
| | <p>(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.</p> <p>(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.</p> <p>(f) Should two or more bids be equal in all respects, the award shall be decided by the drawing of lots.</p> <p>3. POINTS AWARDED FOR PRICE THE 80/20 PREFERENCE POINT SYSTEMS</p> <p>A maximum of 80 points is allocated for price on the following basis:</p> <p style="text-align: center;">80/20</p> $P_s = 80 \left(1 - \frac{P_t - P_{\min}}{P_{\min}} \right)$ <p>Where</p> <p>Ps = Points scored for comparative price of bid under consideration</p> <p>Pt = Comparative price of bid under consideration</p> <p>Pmin = Comparative price of lowest acceptable bid</p> |
| <p>C.3.12</p> | <p>Add the following to the clause:</p> <p>“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.”</p> |
| <p>C.3.13.1</p> | <p>Add to the existing clause:</p> <p>Tender offers will only be accepted if:</p> <ol style="list-style-type: none"> 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 number; c) the tenderer submits a letter of intent from an approved insurer undertaking to provide the On-Demand Performance Guarantee to the format included in Part T2.2.22 of this procurement document d) the tenderer is registered with the Construction Industry Development Board in an appropriate contractor grading designation; e) the tenderer or any of its directors/shareholders is not listed on the Register of Tender Defaulters in terms of the Prevention and Combating of Corrupt Activities Act of 2004 as a person prohibited from doing business with the public sector; f) the tenderer has not: <ol style="list-style-type: none"> 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; |



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| | |
|--------|---|
| | <ul style="list-style-type: none">g) the tenderer has completed the Compulsory Enterprise Questionnaire and there are no conflicts of interest which may impact on the tenderer's ability to perform the contract in the best interests of the Employer or potentially compromise the tender process and persons in the employ of the state are permitted to submit tenders or participate in the contract;h) the tenderer is registered and in good standing with the compensation fund or with a licensed compensation insurer;i) the Employer is reasonably satisfied that the tenderer has in terms of the Construction Regulations, 2014, issued in terms of the Occupational Health and Safety Act, 1993, the necessary competencies and resources to carry out the work safely; andj) the tenderer:<ul style="list-style-type: none">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



VOLUME 1

RETURNABLE DOCUMENTS AND SCHEDULES

T2.1 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.2 |
| T2.1.2 Certificate of Authority | RD.5 |
| T2.1.3 Compulsory Enterprise Questionnaire | RD.10 |
| T2.1.4 Preferential Procurement | RD.13 |
| MBD 6.1 Preference points claim form in terms of the preferential procurement regulations | RD.14 |
| MBD 4 Declaration of any potential conflict of interest | RD.21 |
| MBD 8 Declaration of bidder's past Supply Chain management practices | RD.26 |
| MBD 5 Declaration for Procurement above R10 Million (VAT Included) | RD.28 |
| MBD 9 Certificate of independent bid determination | RD.29 |
| T2.1.5 Proposed qualifications | RD.33 |
| T2.1.6 Schedule of the Tenderer's experience | RD.34 |
| T2.1.7 Contactable reference template | RD.39 |
| T2.1.8 Schedule of key personnel | RD.35 |
| T2.1.9 Curriculum vitae of key personnel | RD.41 |

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.48 |
| T2.2.2 SARS Tax Compliance Status Pin and Proof of CSD registration i.e. MA number | RD.49 |

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.

T2.1 LIST OF 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.2 |
| T2.1.2 Certificate of Authority | RD.5 |
| T2.1.3 Compulsory Enterprise Questionnaire | RD.10 |
| T2.1.4 Preferential Procurement | RD.13 |
| T2.1.5 Proposed qualifications | RD.33 |
| T2.1.6 Schedule of the Tenderer's experience | RD.34 |
| T2.1.7 Contactable reference template | RD.39 |
| T2.1.8 Schedule of key personnel | RD.35 |
| T2.1.9 Curriculum vitae of key personnel | RD.41 |



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T2.1 and T2.3 List of Returnable Documents

T2.1.1 Record of Addenda to Tender Documents

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

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

Attach additional pages if more space is required.

Signed Date

Name Position

Tenderer



T2.1.2 Certificate of Authority

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

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

(I) Certificate For Company

I,, chairperson of the Board of Directors of, hereby confirm that by resolution of the Board (copy attached) taken on, Mr/Ms, acting in the capacity of, was authorized to sign all documents in connection with the tender for Contract No. JW14471 and any contract resulting from it on behalf of the company.

Chairman:

As Witnesses: 1.....

2.....

Date:



(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.



(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.



(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.



(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:

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T2.1.3 Compulsory Enterprise Questionnaire

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

Section 1: Name of enterprise:

Section 2: VAT registration number, if any:

Section 3: CIDB registration number, if any:

Section 4: Particulars of sole proprietors and partners in partnerships

| Name* | Identity number* | Personal income tax number* |
|-------|------------------|-----------------------------|
| | | |
| | | |
| | | |

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

Section 5: Particulars of companies and close corporations

Company registration number

Close corporation number

Proof of CSD registration ie MA xxxxxxxx number

SARS Tax Compliance status Pin number

Section 6: Record in the service of the state

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

- | | |
|--|---|
| <input type="checkbox"/> a member of any municipal council | <input type="checkbox"/> 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) |
| <input type="checkbox"/> a member of any provincial legislature | <input type="checkbox"/> a member of an accounting authority of any national or provincial public entity |
| <input type="checkbox"/> a member of the National Assembly or the National Council of Province | <input type="checkbox"/> an employee of Parliament or a provincial legislature |
| <input type="checkbox"/> a member of the board of directors of any municipal entity | |
| <input type="checkbox"/> 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 |
| | | | |
| | | | |
| | | | |
| | | | |

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| | | |
|--|--|--|
| | | |
|--|--|--|

*insert separate page if necessary

Section 7: Record of spouses, children and parents in the service of the state

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

- | | |
|--|---|
| <input type="checkbox"/> a member of any municipal council | <input type="checkbox"/> 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) |
| <input type="checkbox"/> a member of any provincial legislature | |
| <input type="checkbox"/> a member of the National Assembly or the National Council of Province | <input type="checkbox"/> a member of an accounting authority of any national or provincial public entity |
| <input type="checkbox"/> a member of the board of directors of any municipal entity | <input type="checkbox"/> an employee of Parliament or a provincial legislature |
| <input type="checkbox"/> 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 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.



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Signed

Date _____

Name

Position _____

Enterprise name

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.14 |
| MBD 4 | Declaration of any potential Conflict of Interest | Form to be completed by the Tenderer | RD.Error! Bookmark not defined. |
| MBD 8 | Declaration of bidder's past supply chain management practices | Form to be completed by the Tenderer | RD.26 |
| MBD 5 | Declaration for Procurement above R10 Million (VAT Included) | Form to be completed by the Tenderer | RD.28 |
| 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.

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

1.2 **To be completed by the organ of state**
(delete whichever is not applicable for this tender).

- a) The applicable preference point system for this tender is the 80/20 preference point system.
- b) 80/20 preference point system will be applicable in this tender. The lowest acceptable tender will be used to determine the accurate system once tenders are received.

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

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

1.4 **To be completed by the organ of state:**
The maximum points for this tender are allocated as follows:

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

- 1.5 Failure on the part of a tenderer to submit proof or documentation required in terms of this tender to claim points for specific goals with the tender, will be interpreted to mean that preference points for specific goals are not claimed.
- 1.6 The organ of state reserves the right to require of a tenderer, either before a tender is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the organ of state.

2. DEFINITIONS

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

3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1 POINTS AWARDED FOR PRICE

3.1.1 THE 80/20 PREFERENCE POINT SYSTEMS

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

80/20

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

Where

P_s = Points scored for price of tender under consideration

P_t = Price of tender under consideration

P_{min} = Price of lowest acceptable tender

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

1.1.1. POINTS AWARDED FOR PRICE

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

80/20

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

Where

P_s = Points scored for price of tender under consideration

P_t = Price of tender under consideration

P_{max} = Price of highest acceptable tender

4. POINTS AWARDED FOR SPECIFIC GOALS

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

4.2 In cases where organs of state intend to use Regulation 3(2) of the Regulations, which states that, if it is unclear whether the 80/20 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

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(b) any other invitation for tender, that either the 80/20 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 80/20 preference point system.

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

(Note to organs of state: Where either the 80/20 preference point system is applicable, corresponding points must also be indicated as such.)

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

| The specific goals allocated points in terms of this tender | Number of points allocated (80/20 system) | Number of points claimed (80/20 system) (To be completed by the tenderer) |
|---|---|---|
| Businesses located within the boundaries of COJ | 10 | |
| Business owned by 51% or more- Black Youth | 10 | |
| TOTAL | 20 | |

5. DECLARATION WITH REGARD TO COMPANY/FIRM

5.1 Name _____ of _____ com-
pany/firm.....

5.2 Company _____ registration _____ number:
.....

5.3 TYPE OF COMPANY/ FIRM

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

[TICK APPLICABLE BOX]

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

- 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;

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

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

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1. SUB-CONTRACTING

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

(Tick applicable box)

| | | | |
|-----|--------------------------|----|--------------------------|
| YES | <input type="checkbox"/> | NO | <input type="checkbox"/> |
|-----|--------------------------|----|--------------------------|

1.1.1 If yes, indicate:

- i) What percentage of the contract will be subcontracted _____ (minimum of 13%)
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 | <input type="checkbox"/> | NO | <input type="checkbox"/> |
|-----|--------------------------|----|--------------------------|

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

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



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| OR | | |
|---------|--|--|
| Any EME | | |
| Any QSE | | |

2. DECLARATION WITH REGARD TO COMPANY/FIRM

2.1 Name of company/firm:

2.2 VAT number registration number:

2.3 Company registration number:

2.4 TYPE OF COMPANY/ FIRM

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

[TICK APPLICABLE BOX]

2.5 DESCRIBE PRINCIPAL BUSINESS ACTIVITIES

.....

.....

.....

.....

.....

2.6 COMPANY CLASSIFICATION

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

[TICK APPLICABLE BOX]

2.7 MUNICIPAL INFORMATION

Municipality where business is situated:

Registered Account Number:

Stand Number:



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

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

- v) The information furnished is true and correct;
- vi) In the event of a contract being awarded as a result of points claimed as shown in MBD 6.1, the contractor is required to furnish documentary proof as requested in the Tender Data to the satisfaction of the purchaser that the claims are correct;
- vii) If the specific goals points have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the purchaser may, in addition to any other remedy it may have –
 - (f) disqualify the person from the bidding process;
 - (g) recover costs, losses or damages it has incurred or suffered as a result of that person’s conduct;
 - (h) 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;
 - (i) 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
 - (j) forward the matter for criminal prosecution.

| |
|--|
| <p>WITNESSES</p> <p>1.</p> <p>2.</p> |
|--|

| |
|---|
| <p>.....</p> <p>SIGNATURE(S) OF BIDDERS(S)</p> |
| <p>DATE:</p> <p>ADDRESS</p> <p>.....</p> <p>.....</p> |

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, hareholder²):.....

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.



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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:.....
.....



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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

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 <input type="checkbox"/> | No <input type="checkbox"/> |
| 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 <input type="checkbox"/> | No <input type="checkbox"/> |
| 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 <input type="checkbox"/> | No <input type="checkbox"/> |
| 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 <input type="checkbox"/> | No <input type="checkbox"/> |
| 4.4.1 | If so, furnish particulars: | | |



CERTIFICATION

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

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

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder



MBD 5

DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (VAT INCLUDED)

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

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

1.1 If yes, submit audited annual financial statements for the past three years or since the date of establishment if established during the past three years.

.....
.....

2. If the bidder is not required by law to prepare annual financial statements for auditing, they shall be required to furnish their Annual Financial Statements -

i. for the past three years , or
ii. since their establishment if established during the past three years

Do you have any outstanding undisputed commitments for municipal services towards a municipality or any other service provider in respect of which payment is overdue for more than 30 days? **YES / NO**

2.1 If no, this serves to certify that the bidder has no undisputed commitments for municipal services towards a municipality or other service provider in respect of which payment is overdue for more than 30 days.

2.2 If yes, provide particulars.
.....
.....



3 Has any contract been awarded to you by an organ of state during the past five years, including particulars of any material non-compliance or dispute concerning the execution of such contract? **YES / NO**

3.1 If yes, furnish particulars

.....
.....

4 Will any portion of goods or services be sourced from outside the Republic, and, if so, what portion and whether any portion of payment from the municipality / municipal entity is expected to be transferred out of the Republic? **YES / NO**

4.1 If yes, furnish particulars

.....
.....

CERTIFICATION

I, THE UNDERSIGNED (NAME)

.....

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

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

FALSE.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

MBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

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

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

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

MBD 9 CERTIFICATE OF INDEPENDENT BID DETERMINATION

I, the undersigned, in submitting the accompanying bid:

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

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

I certify, on behalf of _____ that:
(Name of Bidder)

1. I have read, and I understand the contents of this Certificate;
2. I understand that the accompanying bid will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on behalf of the bidder;
4. Each person whose signature appears on the accompanying bid has been authorized by the bidder to determine the terms of, and to sign, the bid, on behalf of the bidder;
5. For the purposes of this Certificate and the accompanying bid, I understand that the word "competitor" shall include any individual or organization, other than the bidder, whether or not affiliated with the bidder, who:
 - (a) has been requested to submit a bid in response to this bid invitation;
 - (b) could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience; and
 - (c) provides the same goods and services as the bidder and/or is in the same line of business as the bidder
6. The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium³ will not be construed as collusive bidding.
7. In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
 - (a) prices;
 - (b) geographical area where product or service will be rendered (market allocation)
 - (c) methods, factors or formulas used to calculate prices;
 - (d) the intention or decision to submit or not to submit, a bid;
 - (e) the submission of a bid which does not meet the specifications and conditions of the bid; or

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.**



Contract No JW14471
RENOVATIONS AT NORTHERN WORKS LABORATORY
AND FLOW LABORATORY



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

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder



T2.1.5 Proposed Amendments and Qualifications

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

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

| Page | Clause or item | Proposal |
|------|----------------|----------|
| | | |

Signed Date

Name Position

Tenderer



T2.1.6 Schedule of the Tenderer's Experience

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

Signed _____ Date _____

Name _____ Position _____

| | |
|-----------------|--|
| <i>Tenderer</i> | |
|-----------------|--|



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. **JW14471-RENOVATIONS AT NORTHERN WORKS LABORATORY AND FLOW LABORATORY**

Name of Tenderer:

Name of Project:

Description of Services provided in Building Construction projects.
.....
.....

Contract Value (R).....

Name of Client Company

Name of Main Client Company (Employer if different from name of client company)
.....

Name of authorized person/Referee completing this Letter.....

Signature of authorized person/Referee:**Date**

Telephone/Mobile of authorized person/Referee:

Email address of authorized person/Referee:

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.
If Bidder was a Subcontractor on the Project – Proof of Subcontracting Agreement between Bidder and Main Contractor plus Reference Letter to be submitted As Stated Above.



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. **JW14471-RENOVATIONS AT NORTHERN WORKS LABORATORY AND FLOW LABORATORY**

Name of Tenderer:

Name of Project:

Description of Services provided in Building Construction projects.

.....
.....

Contract Value (R).....

Name of Client Company

Name of Main Client Company (Employer if different from name of client company)

.....

Name of authorized person/Referee completing this Letter.....

Signature of authorized person/Referee: **Date**

Telephone/Mobile of authorized person/Referee:

Email address of authorized person/Referee:

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. Additionally, we reserve the right to request further information, such as final architectural drawings, or to conduct site visits if deemed necessary to verify the accuracy of the submitted details.
If Bidder was a Subcontractor on the Project – Proof of Subcontracting Agreement between Bidder and Main Contractor plus Reference Letter to be submitted As Stated Above.



T2.1.7 Contactable Reference Template

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Name of Project:

Description of Services provided in Building Construction projects.

.....
.....

Contract Value (R).....

Name of Client Company

Name of Main Client Company (Employer if different from name of client company)

.....

Name of authorized person/Referee completing this Letter.....

Signature of authorized person/Referee: **Date**

Telephone/Mobile of authorized person/Referee:

Email address of authorized person/Referee:

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. Additionally, we reserve the right to request further information, such as final architectural drawings, or to conduct site visits if deemed necessary to verify the accuracy of the submitted details.
If Bidder was a Subcontractor on the Project – Proof of Subcontracting Agreement between Bidder and Main Contractor plus Reference Letter to be submitted As Stated Above.



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Name of Tenderer:

Name of Project:

Description of Services provided in Building Construction projects.

.....
.....

Contract Value (R).....

Name of Client Company

Name of Main Client Company (Employer if different from name of client company)

.....

Name of authorized person/Referee completing this Letter.....

Signature of authorized person/Referee:**Date**

Telephone/Mobile of authorized person/Referee:

Email address of authorized person/Referee:

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. Additionally, we reserve the right to request further information, such as final architectural drawings, or to conduct site visits if deemed necessary to verify the accuracy of the submitted details.

If Bidder was a Subcontractor on the Project – Proof of Subcontracting Agreement between Bidder and Main Contractor plus Reference Letter to be submitted As Stated Above.



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. **JW14471-RENOVATIONS AT NORTHERN WORKS LABORATORY AND FLOW LABORATORY**

Name of Tenderer:

Name of Project:

Description of Services provided in Building Construction projects.

.....
.....

Contract Value (R).....

Name of Client Company

Name of Main Client Company (Employer if different from name of client company)
.....

Name of authorized person/Referee completing this Letter.....

Signature of authorized person/Referee:**Date**

Telephone/Mobile of authorized person/Referee:

Email address of authorized person/Referee:

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. Additionally, we reserve the right to request further information, such as final architectural drawings, or to conduct site visits if deemed necessary to verify the accuracy of the submitted details.
If Bidder was a Subcontractor on the Project – Proof of Subcontracting Agreement between Bidder and Main Contractor plus Reference Letter to be submitted As Stated Above.

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T2.1.8 Schedule of Key Personnel

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

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

| CATEGORY OF EMPLOYEE | NUMBER OF PERSONS | | | | | |
|---|--|---------|---|---------|--|---------|
| | KEY PERSONNEL, PART OF THE CONTRACTOR'S ORGANISATION | | KEY PERSONNEL TO BE IMPORTED IF NOT AVAILABLE LOCALLY | | UNSKILLED PERSONNEL TO BE RECRUITED FROM LOCAL COMMUNITY | |
| | HDI | NON-HDI | HDI | NON-HDI | HDI | NON-HDI |
| Construction Manager, Contracts Manager | | | | | | |
| Foremen, Quality Control and Safety Personnel | | | | | | |
| Technicians, Surveyors, etc. | | | | | | |
| Artisans and other Skilled workers | | | | | | |
| Plant Operators | | | | | | |
| Unskilled Workers | | | | | | |
| Others: | | | | | | |

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

DATE:

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T2.1.9 Curriculum Vitae of Key Personnel

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

| | |
|-------------------------------------|--------------------------|
| Proposed role in the project | Contracts Manager |
|-------------------------------------|--------------------------|

| | |
|----------------------|--|
| 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 | Organisa- tion | (Date from – Date to) | Years of Employ- ment | Position |
|-----------------------|----------------|-----------------------|-----------------------|----------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

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6. Project-based Experience

| | |
|---|--|
| Project Name and Client | |
| Project Dates and Value | |
| Project position (e.g. Contract Manager, Construction Manager, etc.) | |
| Description of Scope and Duties | |

| | |
|---|--|
| Project Name and Client | |
| Project Dates and Value | |
| Project position (e.g. Contract Manager, Construction Manager, etc.) | |
| Description of Scope and Duties | |

| | |
|---|--|
| Project Name and Client | |
| Project Dates and Value | |
| Project position (e.g. Contract Manager, Construction Manager, etc.) | |
| Description of Scope and Duties | |

Duplicate relevant section to add more information, if required.

Certification:

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

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

.....
Date

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| | |
|-------------------------------------|-------------------|
| Proposed role in the project | Site Agent |
|-------------------------------------|-------------------|

| | |
|----------------------|--|
| 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 | Organisa- tion | (Date from – Date to) | Years of Employ- ment | Position |
|------------------------------|---------------------------|------------------------------|----------------------------------|-----------------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

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6. Project-based Experience

| | |
|---|--|
| Project Name and Client | |
| Project Dates and Value | |
| Project position (e.g. Contract Manager, Construction Manager, etc.) | |
| Description of Scope and Duties | |

| | |
|---|--|
| Project Name and Client | |
| Project Dates and Value | |
| Project position (e.g. Contract Manager, Construction Manager, etc.) | |
| Description of Scope and Duties | |

| | |
|---|--|
| Project Name and Client | |
| Project Dates and Value | |
| Project position (e.g. Contract Manager, Construction Manager, etc.) | |
| Description of Scope and Duties | |

Duplicate relevant section to add more information, if required.

Certification:

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

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

.....
Date

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| | |
|-------------------------------------|-----------------------|
| Proposed role in the project | Safety Officer |
|-------------------------------------|-----------------------|

| | |
|----------------------|--|
| 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 | Organisa- tion | (Date from – Date to) | Years of Employ- ment | Position |
|------------------------------|---------------------------|------------------------------|----------------------------------|-----------------|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Volume 1 Tender and Contract
T2.1 and T2.3 List of Returnable Documents

6. Project-based Experience

| | |
|---|--|
| Project Name and Client | |
| Project Dates and Value | |
| Project position (e.g. Contract Manager, Construction Manager, etc.) | |
| Description of Scope and Duties | |

| | |
|---|--|
| Project Name and Client | |
| Project Dates and Value | |
| Project position (e.g. Contract Manager, Construction Manager, etc.) | |
| Description of Scope and Duties | |

| | |
|---|--|
| Project Name and Client | |
| Project Dates and Value | |
| Project position (e.g. Contract Manager, Construction Manager, etc.) | |
| Description of Scope and Duties | |

Duplicate relevant section to add more information, if required.

Certification:

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

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

.....
Date

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.48 |
| T2.2.2 SARS Tax Compliance Status Pin and Proof of CSD registration i.e. MA xxxxxxxxxxx number | RD.49 |



T2.2.1 Contractor's Certificate of Registration With CIDB

NB: The Tenderer shall attach here to 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.

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

SIGNATURE:.....

DATE:

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



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

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

SIGNATURE:.....

DATE:

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

T2.3 LIST OF RETURNABLE SCHEDULES

Document

Page

3. Returnable Schedules that will be incorporated into the contract

T2.3.1 Imported content sheet: forward exchange cover for imported goods RD.51



T2.3.1 Imported Content Sheet: Forward Exchange Cover for Imported Goods

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

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

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

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

Exchange rate(s) as at (insert date)

| Country | Exchange Rate |
|---------|---------------|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

SIGNED ON BEHALF OF TENDERER :

NAME (in print) :

DATE :

T2.4 LIST OF RETURNABLE SCHEDULES

| <u>Document</u> | <u>Page</u> |
|---|-------------|
| 4. Other documents that will be incorporated into the contract | |
| T2.4.1 JW 6.4 Returnable Annexure A – SHE Acknowledgment form | RD. 50 |
| T2.4.2 JW 6.5 Returnable Annexure B: Acknowledgement of Tender Drawings | RD. 52 |



T2.4.1 JW 6.4 Returnable Annexure A: Acknowledgement of SHE Specification & Annexures

DECLARATION BY CONTRACTOR

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

- OHS Specification (Volume 2)
- Annexure 1: COVID-19 Guidelines
- Annexure 2: Baseline Risk Assessment and COVID-19 Risk Assessment
- Annexure 3: Medical Screening Policy
- Annexure 4: Contractor Competency Evaluation
- Annexure 5: Sign off form
- Annexure 6: Environmental Management Plan
- Annexure 7: Environmental Specification

We furthermore commit to:

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

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

| | |
|----------------------------------|--|
| Name of tenderer | |
| Name of Authorized person | |
| Authorized Signature* | |

T2.4.2 JW 6.5 Returnable Annexure B: Acknowledgement of Tender Drawings

DECLARATION BY CONTRACTOR

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

The drawings that are issued for **TENDER PURPOSES** are shown in Volume 4.

The Drawing Register is shown below :

| | | | |
|--|---------------------------------------|---------------------------------------|----------------------------------|
| DRAWING REGISTER | | | |
| PROJECT NAME: RENOVATIONS AT NORTHERN WORKS LABORATORY AND FLOW LABORATORY | | | |
| PROJECT NO. : JW14471 | | | |
| PROJECT STATUS: TENDER | | | |
| RENOVATIONS AT NORTHERN WORKS LABORATORY AND FLOW LABORATORY LIST OF DRAWINGS | | | |
| TITLE OF DRAWINGS | PRO- JECT NUM- BER | DRAW- ING NUM- BER | RE- VI- SIO N |
| 1. ARCHITECTURAL DRAWINGS | | | |
| 1.1 NORTHERN WORKS | | | |
| RENOVATIONS AT NORTHERN WORKS LABORATORY | JW14471 | ARCH-01 | 0 |
| | | | |
| 2. STRUCTURAL DRAWINGS | | | |
| 2.1 FLOW LABORATORY | | | |
| CONCRETE SUMP, CHANNELS, PIPELINE LAYOUT, SECTIONS & DETAILS | JW14471 | STRUCT-01 | 0 |
| STORMWATER LAYOUT & DETAILS | JW14471 | STRUCT-02 | 0 |

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| | | | |
|--|---------|----------------|---|
| MEZZANINE STEEL STRUCTURE LAYOUT,ELEVATION & DETAILS | JW14471 | STRUCT -03 | 0 |
| | | | |
| 3. NAME BOARD | | | |
| 3.1 FLOW LABORATORY | | | |
| NAME BOARD | JW14471 | STRUCT - 04 | 0 |
| NAME BOARD FRAME DETAILS | JW14471 | STRUCT -05 | 0 |
| | | | |
| 3.2 NORTHERN WORKS | | | |
| NAME BOARD | JW14471 | STRUCT - 06 | 0 |
| NAME BOARD FRAME DETAILS | JW14471 | STRUCT -07 | 0 |

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

| | |
|----------------------------------|--|
| Name of tenderer | |
| Name of Authorized person | |
| Authorized Signature* | |



Contract No JW14471
RENOVATIONS AT NORTHERN WORKS LABORATORY
AND FLOW LABORATORY
Volume 1 Tender and Contract
Contract Data



CONTRACT JW14471

**RENOVATIONS AT NORTHERN WORKS LABORATORY AND FLOW
LABORATORY**

VOLUME 1

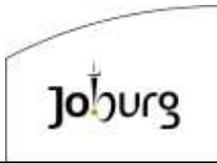
PART C1: AGREEMENT AND CONTRACT DATA



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| C1.2.4 CONTRACT DATA CE (Contractor to Employer) | 27 |
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| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



C1.1 FORM OF OFFER (AGREEMENT)

C1.1.1 FORM OF OFFER

THE TENDERER 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:

JW14471 – RENOVATIONS AT NORTHERN WORKS LABORATORY AND FLOW LABORATORY

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

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

THE OFFERED TOTAL OF THE PRICES INCLUSIVE OF VALUE ADDED TAX IS

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

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

Signature(s)

Name(s)

Capacity

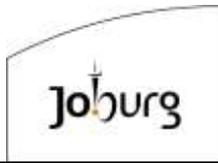
For the Tenderer

(Name and address of organisation)

**Name and
signature of
witness**

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

The terms of the contract are contained in

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

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

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

The Tenderer shall within 28 days after receiving a completed copy of this Agreement, including the Schedule of Deviations (if any), contact the Principal 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 Tenderer receives one fully completed copy of this document, including the Schedule of Deviations (if any). Unless the Tenderer (now the Contractor) within five days after the date of such receipt notifies the Employer in writing of any reason why he cannot accept the contents of this Agreement, this Agreement shall constitute binding contract between the parties.

FOR EMPLOYER OFFICIAL USE ONLY

Signature(s)

Name(s)

Capacity

For the Employer

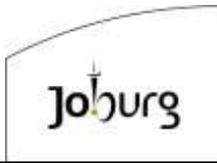
Johannesburg Water SOC Ltd, Turbine Hall, 65 Ntemi Piliso Street, Newtown, Johannesburg

(Name and address of organisation)

Name and signature of witness

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 Tenderer's covering letter shall not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid become the subject of agreements reached during the process of offer and acceptance, the outcome of such agreement shall be recorded here;
3. Any other matter arising from the process of offer and acceptance either as a confirmation, clarification or change to the tender documents and which it is agreed by the Parties becomes an obligation of the contract shall also be recorded here; and
4. Any change or addition to the tender documents arising from the above arrangements and recorded here shall also be incorporated into the final draft of the Contract.

1 Subject _____

Details _____

2 Subject _____

Details _____

3 Subject _____

Details _____

4 Subject _____

Details _____

5 Subject _____

Details _____

6 Subject _____

Details _____

7 Subject _____

Details _____

8 Subject _____

Details _____

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

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



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

For the Tenderer:

Signature(s)

Name(s)

Capacity

 (Name and address of organisation)

**Name and
signature of
witness**

Date

For the Employer:

Signature(s)

Name(s)

Capacity

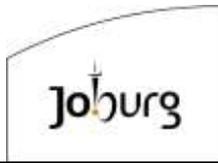
*Johannesburg Water SOC Ltd, Turbine Hall, 65 Ntemi Piliso Street,
 Newtown, Johannesburg*

 (Name and address of organisation)

**Name and
signature of
witness**

Date

| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



C1.2 CONTRACT DATA

C1.2.1 PART 1: DATA PROVIDED BY THE EMPLOYER

CONDITIONS OF CONTRACT

The Conditions of Contract are the **JBCC® Series 2000 Principal Building Agreement (July 2007 Edition 5.0 - Reprint 1)** published by the Joint Building Contract Committee. Copies of these documents may be obtained from the **Association of South African Quantity Surveyors** (011-315 4140), the **Master Builders Association** (011-205 9000), the **South African Association of Consulting Engineers** (011-463 2022) or the **South African Institute of Architects** (011-486 0684).

The **JBCC® Principal Building Agreement Contract Data EC** and the **JBCC® Principal Building Agreement Contract Data CE** form an integral part of this agreement.

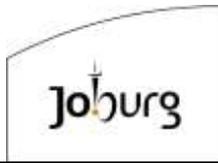
The **ASAQS Preliminaries (November 2007 Edition)** published by the Association of South African Quantity Surveyors for use with the said JBCC Principal Building Agreement shall be deemed to be incorporated in the bills of quantities.

The **Model Preambles for Trades (2008 Edition)** as published by the Association of South African Quantity Surveyors shall be deemed to be incorporated in the bills of quantities and no claims arising from brevity of description of items fully described in the said Model Preambles will be entertained.

The **SANS 1200 Standardised Specification for Civil Engineering Construction**, and specific amendments and additions shall be deemed to be incorporated in the Civil bill of Quantities.

Delta BEC **Electrical specification** shall be deemed to be incorporated in the **Electrical Bill of Quantities**.

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



C1.2.2 CONTRACT DATA EC (Employer to Contractor)

Employer Addendum Code 2101-EC

FOR INFORMATION ONLY, TO BE SIGNED ON APPOINTMENT

Introduction

This addendum contains all variables referred to in the JBCC® Principal Building Agreement that are the responsibility of the Contractor to provide the appropriate information that is necessary for the Contractor to complete his tender. The Addendum must be completed in full and included in the tender documents. The Addendums “Contract Data – EC”, “Contract Data – CE”, “Contract Data – ES” and “Contract Data – SE” form part of the contract between the parties.

Definitions

The definitions used in this document and the interpretation thereof are as listed in the JBCC® Principal Building Agreement. The work or phrase of a definition is in **bold text** and shall bear the meaning assigned to it in the JBCC® Principal Building Agreement. Where such word or phrase is not highlighted it shall bear the meaning consistent with the context of its use. The listed defined word or phrase does not qualify as a definition where information required to be stated in the **contract data** has not been provided.

Provision of Contract Data

Spaces requiring information must be filled in, shown as “not applicable” or deleted and not left blank. Where choices are offered, the non-applicable items are to be clearly struck out. Where insufficient space is provided, the additional information should be annexed hereto and cross referenced to the applicable clause of the **contract data**.

Reference Clauses

Where relevant, the JBCC® Principal Building Agreement clause applicable to the required information is printed in italics under the Contract Data clause number i.e. *[27.4.2]*

| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |

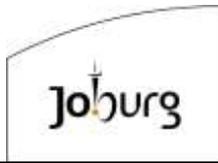


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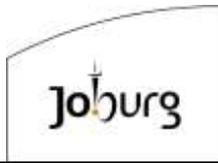
| Section No. | Description |
|-------------|--|
| 1.0 | CONTRACTING AND OTHER PARTIES |
| 2.0 | CONTRACT AND SITE INFORMATION |
| 3.0 | INSURANCES AND SECURITIES |
| 4.0 | PRACTICAL COMPLETION DATES AND PENALTIES |
| 5.0 | DOCUMENTS AND GENERAL |
| 6.0 | CHANGES MADE TO THE STANDARD JBCC DOCUMENT |
| 7.0 | DECLARATION BY THE PRINCIPAL AGENT |

CONTRACT DATA – EMPLOYER

1.0 CONTRACTING AND OTHER PARTIES

| | | | | |
|--------------|--------------------------|--|----------------|-----------|
| 1.1 [1.2] | Employer: | Johannesburg Water (Pty) Ltd | | |
| | Postal Address: | PO Box 61542, Marshalltown | Code: | 2107 |
| | Physical Address: | 65 Ntemi Piliso Street, Newtown, Johannesburg | Code: | 2107 |
| | Tel no.: | +27 11 688 1671 | E-mail: | |
| | Fax no.: | | Person: | W. Chitsa |
| | VAT no.: | 4270191077 | | |
| 1.2 [5.1] | Principal Agent: | TBA | Person: | TBA |
| | Postal Address: | | Code: | |
| | Tel no.: | | E-mail: | |
| | Fax no.: | | | |
| 1.3 [5.2] | Agent (1): | TBA | Person: | TBA |
| | Agent's Service: | | | |
| | Postal Address: | | Code: | |
| | Tel no.: | | E-mail: | |
| | Fax no.: | | | |
| 1.4 [5.2] | Agent (2): | TBA | Person: | TBA |
| | Agent's Service: | | | |
| | Postal Address: | | Code: | |
| | Tel no.: | | E-mail: | |
| | Fax no.: | | | |
| 1.5 [5.2] | Agent (3): | TBA | Person: | TBA |
| | Agent's Service: | | | |

| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Postal Address: _____ Code: _____
 Tel no.: _____ E-mail: _____
 Fax no.: _____

1.6 Agent (4): TBA Person: TBA
 [5.2] Agent's Service: _____
 Postal Address: _____ Code: _____
 Tel no.: _____ E-mail: _____
 Fax no.: _____

1.8 Interest of principal agent or another agent in the project. (yes/no)
 [5.5] Details where "yes": N/A

1.9 The **principal agent** named in 1.2 above is responsible for the preparation of the **contract data** schedule and must be contacted should the **contractor** be uncertain of the information provided or to be provided. Failure to complete the **contract data** schedule in full may result in the tender being disqualified.

2.0 CONTRACT AND SITE INFORMATION

2.1 The law applicable to this agreement: (Country / State)
 [1.7]

2.2 Works identification: Refer to Part 3. Scope of Works
 [1.1]

2.3 Site description: Johannesburg Water Midrand Depot, 87 Erand AH, Cnr New Road & Sixth Road, Midrand, Johannesburg
 [1.1]

2.4 Possession of the site is to be given on: (Date)
 [1.5.2.1]

- Insurances have been effected [12.2];
- Security has been provided to the Employer [14.1];
- Contractor's Lien has been signed;
- Safety Plan has been approved by the Employer.

2.5 Period for the commencement of the works after the contractor takes possession of the site: (working days)
 [15.3]

2.6 Completion of the works in sections is required. (yes/no) (No. of sections)
 [15.4], [28.0]

2.7 Waiver of the contractor's lien or right of continuing possession is required. (yes/no)
 [3.3], [31.16.2]

2.8 Defined restrictions to the site area. Where "yes" the specific requirements are described below or detailed in the contract documents. (yes/no)
 [16.1]

2.9 Geotechnical investigation of the site has been undertaken. Where "yes" the results are included in the contract documents. (yes/no)
 [16.4]

2.10 Existing premises will be occupied. Where "yes" the specific requirements are described below or detailed in the contract documents. (yes/no)
 [16.6]

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



| | | | | | |
|----------------|---|----------------------------------|---|-------------|------------|
| 2.11 [16.7] | Provision of temporary services is required. Where “yes” the specific requirements are described below or detailed in the contract documents . | | | (yes/no) | Yes |
| 2.11.1 | Water | Option A Option B Option C | Contractor – his cost Employer – free of charge Contractor – metered (contractor cost) | (A, B or C) | A |
| 2.11.2 | Electricity | Option A Option B Option C | Contractor – his cost Employer – free of charge Contractor – metered (contractor cost) | (A, B or C) | A |
| 2.11.3 | Telecom | Option A Option B Option C | Contractor – his cost Employer – free of charge Contractor – metered (contractor cost) | (A, B or C) | A |
| 2.11.4 | Ablutions | Option A Option B Option C | Contractor – his cost Employer – free of charge Contractor – metered (contractor cost) | (A, B or C) | A |
| 2.12 [16.8] | Protection of existing trees and shrubs is required. Where “yes” the specific requirements are described below or detailed in the contract documents . | | | (yes/no) | No |

3.0 INSURANCE AND SECURITIES

| | | | |
|---|--|-------------------------|---------------------------------|
| 3.1 [10.1.1], [12.6] | Contract works insurance to be effected by: | (Employer / Contractor) | Contractor |
| | For the sum of: | (Amount) | Contract Amount plus 20% |
| | With a deductible of: | (Amount) | Minimum of R10,000-00 |
| 3.2 [10.1.2], [11.1-3], [12.6] | Supplementary / Special insurance to be effected by: | (Employer / Contractor) | Contractor |
| | For the sum of: | (Amount) | N/A |
| | With a deductible of: | (Amount) | N/A |
| 3.3 [10.1.3], [12.6] | Public liability insurance to be effected by: | (Employer / Contractor) | Contractor |
| | For the sum of: | (Amount) | R1,000,000-00 |

| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



| | | | |
|------------------------------|--------------------------------------|-------------------------|------------------------------|
| | With a deductible of: | (Amount) | Minimum of R10,000-00 |
| 3.4 [11.1.1] | Support insurance to be effected by: | (Employer / Contractor) | Contractor |
| | For the sum of: | (Amount) | N/A |
| | With a deductible of: | (Amount) | N/A |
| 3.5 [11.1.2-3], [12.1] | Special insurance to be effected by: | (Employer / Contractor) | Contractor |
| | Type: | | N/A |
| | For the sum of: | (Amount) | N/A |
| | With a deductible of: | (Amount) | N/A |

4.0 PRACTICAL COMPLETION DATES AND PENALTIES

| | | | |
|-------------------------------|--|--|--|
| 4.1 [24.3.1], [30.1-36] | For the works as a whole: The date for practical completion and the penalty per calendar day is: | Date 8 months from the date of site handover excluding all statutory holidays and December Building holiday period | Penalty Amount R 7 500 / day |
|-------------------------------|--|--|--|

Or

| | | | |
|----------------------------|--|--------------------|------------------------------|
| 4.2 [24.3.1], [28.1] | For the works in sections : The date for practical completion and the penalty per calendar day is: | Date N/A | Penalty Amount N/A |
|----------------------------|--|--------------------|------------------------------|

5.0 DOCUMENTS AND GENERAL

| | | | |
|-----------------|---|-----------------|------------------------------|
| 5.1 [3.7] | Construction document copies to be supplied to the contractor free of charge. | (No. of copies) | 3 |
| 5.2 [3.9] | The priced document may be used as a specification of materials and goods and work methods. | (yes / no) | No |
| 5.3 [3.10] | The contractor shall provide a schedule of rates. (yes/no) | No | (Addendum No.) N/A |
| 5.4 [3.11] | Changes made to JBCC standard documents. (yes/no) | Yes | (Addendum No.) Item 6 |
| 5.5 [15.1.1] | On acceptance of the tender the priced document is to be submitted within the stated working days . | (No. of days) | 7 |
| 5.6 | Work to be undertaken by direct contractors . (yes/no) | No | (Addendum No.) N/A |

| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



[22.2]

5.7
[24.9]

On achievement of practical completion, the **contractor** is to hand over manuals etc. related to the works as listed below:

- | | |
|---|--|
| (1) <u>Electrical Certificate of Compliance</u> | (2) <u>Plumbing and drainage Certificate of Compliance</u> |
| (3) <u>Health and Safety Plan</u> | (4) <u>All documentation to comply with Statutory and Legislative requirements</u> |
| (5) <u>Maintenance manuals</u> | (6) <u>As built drawings</u> |
| (7) <u>Occupational Certificate</u> | (8) _____ |
| (9) _____ | (10) _____ |
| (11) _____ | (12) _____ |

5.8
[31.1]
5.9
[4.1]

Interim **payment certificate** to be issued by: (Date of Month)

| |
|------------------|
| 25 th |
|------------------|

The following items of works shall be designed, supplied and installed by the Contractor:

- | | |
|--|------------------------------------|
| (1) <u>Temporary fencing around the site</u> | (2) <u>Traffic management Plan</u> |
|--|------------------------------------|

6.0 CHANGES MADE TO THE STANDARD JBCC DOCUMENT

Note: All changes in detail must be listed below or provided in: (Addendum No.)

| |
|----------------------------|
| Refer to Item C1.2.3 |
|----------------------------|

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|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



C1.2.3 CHANGES TO JBCC PBA

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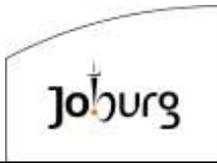
| Section No. | Description |
|-------------|---------------------------|
| 1.0 | DEFINITIONS |
| 2.0 – 14.0 | OBJECTIVE AND PREPARATION |
| 15.0 – 23.0 | EXECUTION |
| 24.0 – 30.0 | COMPLETION |
| 31.0 – 35.0 | PAYMENT |
| 36.0 – 39.0 | TERMINATION |
| 40.0 | DISPUTE |
| 41.0 – 42.0 | CONTRACT AGREEMENT |

DEFINITIONS

Clause 1.0: Definitions and Interpretation

| Clause | Data |
|--------|---|
| | <p>Replace CONSTRUCTION PERIOD with the following: <i>The period commencing on the date on which the possession of the site was handed over to the contractor as recorded on the site possession certificate and ending on the date for practical completion and excluding all statutory holidays and recognized annual building holiday periods.</i></p> <p>Replace CONTRACT MINUTES with the following: <i>A comprehensive set of minutes prepared by the Principal Agent in which all pertinent contractual information that arises at meetings is progressively recorded.</i></p> <p>Replace CONTRACT PERIOD with the following: <i>The period commencing on the date of acceptance in terms of C1.1 and ending on the date of practical completion.</i></p> <p>Replace CONTRACT SUM with the following: <i>The accepted amount provided for in the agreement made in terms of the Form of Offer and Acceptance.</i></p> <p>Replace DATE FOR PRACTICAL COMPLETION with the following: <i>The contractual completion date or dates stated in the contract data or revision thereof [29.0] on or before which the contractor agrees to bring the works or sections thereof to practical completion. The contractor will be liable for the determined penalty in failure of such.</i></p> <p>Replace DATE OF PRACTICAL COMPLETION with the following: <i>The construction completion date or dates, which is initially the intended or planned date or dates to bring the works or sections thereof to practical completion and subsequently the actual or deemed date or dates on which the contractor achieves practical completion.</i></p> <p>Replace PROGRAMME with the following: <i>A diagrammatic representation, made available electronically and in hard copy, of the planned execution sequence of the works indicating the dates for commencement and completion thereof and accepted by the Principal Agent, and shall be used by the contractor to plan and execute the works and by the Principal Agent to monitor progress and shall be the sole basis for the assessment of any claims [29.0].</i></p> |

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



OBJECTIVE AND PREPARATION

Clause 2.0: Offer, Acceptance and Performance Obligations

| | |
|--|--|
| | <i>No change from Principal Building Agreement</i> |
|--|--|

Clause 3.0: Documents

| Clause | Data |
|--------|--|
| 3.6 | <i>The original signed set of contract documents is to be held by the Employer</i> |

Clause 4.0: Design Responsibility

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|--|--|
| | <i>No change from Principal Building Agreement</i> |
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Clause 5.0: Principal Agents

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| | <i>No change from Principal Building Agreement</i> |
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Clause 6.0: Contractor's Site Representative

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| | <i>No change from Principal Building Agreement</i> |
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Clause 7.0: Compliance with Laws and Regulations

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| | <i>No change from Principal Building Agreement</i> |
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Clause 8.0: Works Risk

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| | <i>No change from Principal Building Agreement</i> |
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Clause 9.0: Indemnities

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| | <i>No change from Principal Building Agreement</i> |
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Clause 10.0: General Insurances

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| | <i>Insurance to be taken out by the Contractor</i> |
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Clause 11.0: General Insurances

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| | <i>Insurance to be taken out by the Contractor</i> |
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Clause 12.0: Effecting Assurances

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| | <i>Insurance to be taken out by the Contractor</i> |
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Clause 13.0: Assignment

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| | <i>No change from Principal Building Agreement</i> |
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|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Clause 14.0: Security

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| | <i>The Performance Guarantee shall be irrevocable, On-Demand Performance Guarantee, to be issued exactly in the form of the proforma document provided in favour of the client by a Bank or Recognised Financial Institution or Cash in lieu of bond will apply.</i> |
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EXECUTION

Clause 15.0: Preparation for and Execution of the Works

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| | <i>No change from Principal Building Agreement</i> |
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Clause 16.0: Site and Access

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| | <i>No change from Principal Building Agreement</i> |
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Clause 17.0: Contract Instructions

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| | <i>No change from Principal Building Agreement</i> |
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Clause 18.0: Setting out of the Works

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| | <i>No change from Principal Building Agreement</i> |
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Clause 19.0: Temporary Works and Plant

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| | <i>No change from Principal Building Agreement</i> |
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Clause 20.0: Nominated Sub-contractors

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| | <p><i>The Service Provider shall in addition to clause 20 for monitoring purposes, keep monthly records and transmit to the Client data on the following indicators on a date set by the Employer with regard to all projects implemented:</i></p> <ul style="list-style-type: none"> • <i>Project budget and planned output according to EPWP requirements</i> • <i>Actual Project Expenditure and actual output according to EPWP requirements</i> • <i>Planned and achieved labour intensity</i> • <i>Number of work opportunities created</i> • <i>Demographics of workers employed (disaggregated by women, youth and persons with disabilities)</i> • <i>Wage rate earned on project</i> • <i>Number of person-days of employment created</i> • <i>Copies of Certified Identity documents of workers</i> • <i>Attendance Register in the format provided for by the Employer,</i> • <i>Proof of Payment for all qualifying EPWP Labour.</i> • <i>Signed contracts between contractors and Labourers.</i> • <i>Proof of (Unemployment Insurance Fund) UIF deductions.</i> • <i>Proof of good standing with the Compensation for Occupational Injuries and Diseases ACT (COIDA)</i> • <i>Number of persons who have attended training including the nature and duration of training provided</i> • <i>Assets created, rehabilitated or maintained in accordance with indicators in the EPWP M & E Framework</i> |
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| Employer: | | Contractor: | |
| Witness: | | Witness: | |



| | |
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| | <ul style="list-style-type: none"> • <i>Services provided or delivered in accordance with indicators in the EPWP M & E Framework</i> <p><i>In addition to reporting requirements for the purpose of Work Opportunities created. The service provider shall structure all construction contracts to allow for the development of EME designated Contractors (which will be procured in line with the Employer's Supply Chain Management Policies) and keep monthly records and transmit to the Client data on the following indicators on a date set by the Employer with regard to all projects implemented:</i></p> <ul style="list-style-type: none"> • <i>Project budget and planned output in terms of work packages set aside for subcontracting.</i> • <i>Actual Project Expenditure and actual output according as pare templates issued by the Employer.</i> • <i>Keep Record of EPWP job opportunities created through Targeted Enterprise engagement.</i> • <i>BEE certification of EMEs</i> • <i>CIDB Registration of EME's</i> • <i>Letter of Good Standing with Department of Labour,</i> • <i>Company Registration of EME.s</i> • <i>Appointment Letter and Contract with Lead Contractor.</i> |
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Clause 21.0: Selected Sub-contractors

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| | <i>No change from Principal Building Agreement</i> |
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Clause 22.0: Employer's Direct Contractors

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| | <i>No change from Principal Building Agreement</i> |
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Clause 23.0: Contractor's Domestic Sub-contractors

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| | <i>No change from Principal Building Agreement</i> |
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Clause 23 (b) Local Sub-contractors

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| | <p>Special Conditions</p> <p><i>The successful Tenderer must subcontract a minimum of 12% 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/JBCC.</i></p> <p><i>The successful Tenderer must subcontract a minimum 12% of the Contract value, the following areas of work have been identified for subcontracting:</i></p> <ul style="list-style-type: none"> • <i>Civil Works;</i> <p><i>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:</i></p> <ul style="list-style-type: none"> • <i>An EME or QSE which is at least 51% owned by black people;</i> • <i>An EME or QSE which is at least 51% owned by black people who are youth;</i> |
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|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



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|--|--|
| | <ul style="list-style-type: none"> • 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 . <p>1. Subcontractors must be chosen from National Treasury's Central Supplier Database which can be accessed on National Treasury's website.</p> <p>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 13% of the value of this Contract. In complying with this condition, the following shall be adhered with:</p> <ul style="list-style-type: none"> • 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 Principal 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 Principal Agent. • Where the identified items for subcontracting do not form 13% 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 13% has not been met by the end of the Contract. The Employer will deduct this penalty amount through the Payment Certificate process (Credit Note). 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 |
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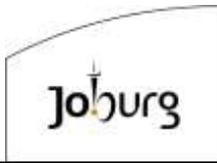
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|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |

| | |
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| | <p><i>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.</i></p> <ul style="list-style-type: none"> • <i>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.</i> • <i>If the Contractor fails to complete the latter 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 senior management, he shall reserve the right to:</i> <ul style="list-style-type: none"> • <i>terminate the Contract</i> <p><i>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:</i></p> <ul style="list-style-type: none"> • <i>Name of Subcontractor and BBBEE status</i> • <i>Subcontractor domicilium and registered address of business, as well as status of compliance with all applicable legal requirements.</i> • <i>Area and location of project</i> • <i>Scope of Work issued to the Subcontractor</i> • <i>Value of the Work issued including P&G's (this information must be submitted in a format that is readily auditable).</i> • <i>Assistance provided/to be provided to the Subcontractor by the Contractor, e.g. acquisition of materials, machinery, tools, etc.</i> • <i>Indicate the remuneration rate of all local labourers (the latest Gazetted labour rates)</i> • <i>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.</i> • <i>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:</i> <ul style="list-style-type: none"> ○ <i>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.</i> ○ <i>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.</i> |
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| Employer: | | Contractor: | |
| Witness: | | Witness: | |

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| | <ul style="list-style-type: none"> ○ <i>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.</i> ○ <i>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.</i> ○ <i>Proof of any such payments made on behalf of the Subcontractor shall be issued to the Principal Agent, on request, with all necessary supporting information that the Principal Agent may request</i> ○ <i>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.</i> <p><i>4.The successful Contractor shall submit periodic SMME/Subcontractor reports to the Principal Agent as follows:</i></p> <ul style="list-style-type: none"> • <i>Status of progress against the Subcontracting Plan (described above), to the approval of the Principal Agent</i> • <i>Subcontractor domicilium and registered address of business, as well as ongoing status of compliance with all applicable legal requirements.</i> • <i>Name of Subcontractor and BBBEE status</i> • <i>Area and location of project</i> • <i>Scope of work issued to the Subcontractor</i> • <i>Value of the work issued (this information must be submitted in a format that is readily auditable)</i> • <i>Monthly payments made to the subcontractor (this information must be submitted in a format that is readily auditable)</i> • <i>Assistance provided to the Subcontractor e.g. advance payments, acquisition of materials, machinery, tools, etc.</i> • <i>Performance of the Subcontractor, with evidence to support this performance assessment.</i> <p><i>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.</i></p> <p><i>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.</i></p> |
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| Employer: | | Contractor: | |
| Witness: | | Witness: | |



COMPLETION

Clause 24.0: Practical Completion

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| | <i>No change from Principal Building Agreement</i> |
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Clause 25.0: Works Completion

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| | <i>No change from Principal Building Agreement</i> |
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Clause 26.0: Final Completion

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| | <i>No change from Principal Building Agreement</i> |
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Clause 27.0: Latent Defects Liability Period

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| | <i>No change from Principal Building Agreement</i> |
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Clause 28.0: Sectional Completion

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| | <i>No change from Principal Building Agreement</i> |
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Clause 29.0: Revision of Date for Practical Completion

| Clause | Data |
|--------|--|
| | <i>Add the following to sub-clause 29.1.1: The adverse effect of weather conditions will exclude for normal weather conditions in the region of the work of this contract.</i> |

Clause 30.0: Penalty for Late or completion

| | |
|--|---|
| | <p><i>In addition to clause 30, during the Contract Period should the Contractor:</i></p> <p>a) Fail to report</p> <ul style="list-style-type: none"> • <i>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.</i> • <i>The penalty value shall be R5,000.00 per report per occasion; and</i> • <i>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> <ul style="list-style-type: none"> <i>i. perform the Works internally or through another Contractor; and</i> <i>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</i> |
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| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |

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 labour or SMME

- *The Employer shall levy a penalty on the Contractor, should the latter fail to provide payment to any labourer or SMME as required in the specification highlighted in the Scope of Work and specified in the appointment agreements with the Contractor and the labourer or SMME.*
- *The penalty value shall be R 50,000.00 per incident per occasion; and*
- *If the Contractor fails to complete the aforementioned more than three incidents and should the Employer or his duly authorised representative find that the Contractor is hindering his (the Employer's) deliverables to JW Senior Management, he shall reserve the right to:*
 - i. *perform the Works internally or through another Contractor; and*
 - ii. *deduct additional costs incurred by the Employer from monies owed to the Contractor or from the Contractor's Guarantee. Additional costs incurred by the Employer shall include all claims from Contract affected parties, claims such as but not be limited to claims from customers, any costs associated with the loss of water, and all costs associated with the procurement of an alternative Contractor.*
 - iii. *terminate the Contract.*

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

c) Failure to meet target participation by local SMME

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

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

d) Failure to meet the occupational health and safety compliance target.

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.

The Employer will impose a penalty value of R10 000,00 per audit report where a Contractor scores below 85%.

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |

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| | <p><i>The Employer will impose a penalty value of R10 000,00 per occasion where the Contractor scores above 85% but below 93% for two successive months.</i></p> <p>e) Failure to meet the Environmental compliance target.</p> <p><i>Monthly compliance rating will be calculated for each Contractor as per a formula determined by the Employer focusing on or incorporating outcomes of assurance (e.g. monthly audit), operational assessments and other requirements, as necessary.</i></p> <p><i>The Employer will impose a penalty value of R10 000,00 per audit report where a Contractor scores below 85%.</i></p> <p><i>The Employer will impose a penalty value of R10 000,00 per occasion where the Contractor scores above 85% but below 93% for two successive months.</i></p> <p>f) Penalties payable</p> <p><i>If penalties are payable, they will be processed through a credit note issued by the Contractor.</i></p> <p>g) Penalties irreversible</p> <p><i>The Contractor shall note that all penalties once imposed shall be non-recoverable or reversible, even if the default is remedied.</i></p> |
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PAYMENT

Clause 31.0: Interim Payment

| Clause | Data |
|---------------|---|
| 31.6 | <p>Payment for Materials on Site</p> <p><i>In addition to the existing provisions under Clause 31, the following shall apply:</i></p> <ul style="list-style-type: none"> <i>• The contractor shall be entitled to claim payment for materials and goods stored on the site, provided they are intended for incorporation into the works and have been verified by the principal agent.</i> <i>• Payment for such materials shall be limited to 80% of their value, as determined and certified by the principal agent, and included in the monthly interim payment certificate.</i> <i>• The contractor must provide evidence of ownership, proof of insurance, and protection measures for the stored materials to the satisfaction of the principal agent before such payment is made.</i> |
| 31.9 | <p><i>Replace Sub-clause 31.9 with the following:</i></p> <p><i>Payment shall be made upon:</i></p> <ul style="list-style-type: none"> <i>• The Contractor will provide a payment certificate with quantities to the Principal Agent before or on the 20th of every month.</i> <i>• After the payment certificate has been approved by Principal Agent, the Contractor must issue an Original Tax Invoice compliant with SARS requirements for Valid Tax Invoice. The date of the Original Tax Invoice must be the date the Principal Agent approved the Payment Certificate. The certificate will then be ready for handing in to the Employer.</i> |

| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



| | |
|---------------|---|
| | <ul style="list-style-type: none"> • <i>Payment will be made within 30 days of approved invoice date.</i> <p><i>Payment shall be subject to the Contractor submitting an Original Tax Invoice compliant with SARS requirements for 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 40.1.</i></p> <ul style="list-style-type: none"> • <i>The maximum percentage retention on the amounts due to the Contractor is 10% of the Contract Sum</i> |
| 31.10 & 31.11 | <i>Replace Clause 31.10 & 31.11 of the JBCC – No interest for late payments will be paid by the Employer.</i> |
| 31.15 | <i>Replace Clause 31.15 - No suspension of works due to delayed or non-payment from the Employer.</i> |

Clause 32.0: Adjustment to the Contract Value

| | |
|--|--|
| | <i>No change from Principal Building Agreement</i> |
|--|--|

Clause 33.0: Recovery of Expense and Loss

| | |
|--|--|
| | <i>No change from Principal Building Agreement</i> |
|--|--|

Clause 34.0: Final Account and Final Payment

| | |
|--|--|
| | <i>No change from Principal Building Agreement</i> |
|--|--|

Clause 35.0: Payment to other Parties

| | |
|--|--|
| | <i>No change from Principal Building Agreement</i> |
|--|--|

TERMINATION

Clause 36.0: Termination by Employer – Contractor’s Default

| | |
|--|--|
| | <i>No change from Principal Building Agreement</i> |
|--|--|

Clause 37.0: Termination by Employer – Loss and Damage

| | |
|--|--|
| | <i>No change from Principal Building Agreement</i> |
|--|--|

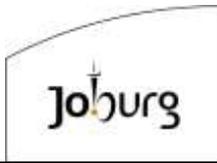
Clause 38.0: Termination by Contractor – Employer’s Default

| | |
|--|--|
| | <i>No change from Principal Building Agreement</i> |
|--|--|

Clause 39.0: Termination – Cessation of the Works

| | |
|--|--|
| | <i>No change from Principal building Agreement</i> |
|--|--|

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



DISPUTE

Clause 40.0: Settlement of Disputes

| | |
|--|--|
| | <p><i>Add the following:</i></p> <p><i>Notwithstanding any other provision of this Contract, the Contractor agrees that there shall be no suspension of the Works due to non-payment by the Client. The Contractor shall continue to perform the Works as scheduled, regardless of any delays or failures by the Client to make payments when due.</i></p> |
|--|--|

CONTRACT AGREEMENT

Clause 41.0: Post Tender Provisions

| | | |
|------|--|-----|
| 41.3 | The dispute resolution body [40.2.2] selected by the parties is | N/A |
| 41.4 | The employer shall provide a Payment Guarantee (Amount) | N/A |
| 41.5 | An annual building industry holiday period is applicable (Yes / No) | Yes |
| 41.6 | Further provisions and information agreed by the parties. None | |

Clause 42.0: Contractual Agreement

42.1 This **Agreement** is the entire contract between the **parties** regarding the matters addressed herein. NO representations, terms, conditions or warranties not contained in this **agreement** shall be binding on the **parties**. No **agreement** or addendum varying, adding to, deleting or terminating this **agreement** including this clause shall be effective unless reduced to writing and signed by the **parties**.

| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



42.2 **Contracting Parties** *(To be completed on signing of the Contract)*

(1) **Employer:**

Physical Address:

Tel No: Fax No:

E-mail:

Tax/VAT No.:

(2) **Contractor:**

Physical Address:

Tel No: Fax No:

E-mail:

Tax/VAT No.:

42.3 The accepted **contract sum** (inclusive of **tax**) (Amount) R

In words:

.....

43.4 Signature of the contracting **parties**:

FOR THE EMPLOYER:

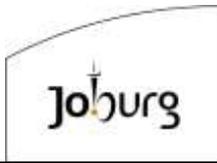
THUS, DONE AND SIGNED AT ON THISDAY

OF 20.....

.....
 Name of signatory for and on behalf of the **employer** who by
 signature hereof warrants authorisation hereto

.....
 Capacity of signatory as Witness (1)

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Details of Witness (1)

Name:

Address:

.....

FOR THE CONTRACTOR:

THUS, DONE AND SIGNED AT ON THISDAY

OF 20.....

.....
 Name of signatory for and on behalf of the **contractor** who by
 signature hereof warrants authorisation hereto

.....
 Capacity of signatory as Witness (2)

Details of Witness (2)

Name:

Address:

.....

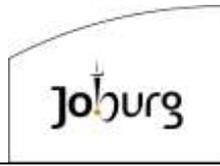
DECLARATION BY THE PRINCIPAL AGENT

I, the principal agent named in 1.2 above, declare that the information provided above is complete and accurate at the time of calling for tenders. Where necessary, should any of the above information need to be varied, tenderers will be informed thereof in writing

Principal Agent:

Date:

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



C1.2.4 CONTRACT DATA CE (Contractor to Employer)

Contractor Addendum Code 2101-CE

**FOR INFORMATION ONLY AND FORMS PART OF THE TENDER DOCUMENT TO BE SIGNED
 ON APPOINTMENT**

Introduction

This addendum contains all variables referred to in the Principal Building Agreement that are the responsibility of the Contractor to provide the appropriate information that is necessary for the Contractor to complete his tender. The Addendum must be completed in full and included in the tender documents. The Addendums “Contract Data – EC”, “Contract Data – CE”, “Contract Data – ES” and “Contract Data – SE” form part of the contract between the parties.

Definitions

The definitions used in this document and the interpretation thereof are as listed in the Principal Building Agreement. The work or phrase of a definition is in **bold text** and shall bear the meaning assigned to it in the Principal Building Agreement. Where such word or phrase is not highlighted, it shall bear the meaning consistent with the context of its use. The listed defined word or phrase does not qualify as a definition where information required to be stated in the **contract data** has not been provided.

Provision of Contract Data

Spaces requiring information must be filled in, shown as “not applicable” or deleted and not left blank. Where choices are offered, the non-applicable items are to be clearly struck out. Where insufficient space is provided, the additional information should be annexed hereto and cross referenced to the applicable clause of the **contract data**.

Reference Clauses

Where relevant, the Principal Building Agreement clause applicable to the required information is printed in italics under the Contract Data clause number i.e. *[27.4.2]*

| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



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| Section No. | Description |
|-------------|---|
| 1.0 | CONTRACTING PARTY |
| 2.0 | SECURITIES |
| 3.0 | PAYMENT AND ADJUSTMENT OF PRELIMINARIES |
| 4.0 | EMPLOYER CHANGES TO JBCC STANDARD DOCUMENTS |
| 5.0 | THE TENDER |

CONTRACT DATA – CONTRACTOR

1.0 CONTRACTING PARTY

1.1 **Contractor:** _____
 [1.2]

Postal Address: _____ **Code:** _____

Physical Address: _____ **Code:** _____

_____ **E-mail:** _____

Tel no.: _____ **Fax no.:** _____

VAT no.: _____

2.0 SECURITIES

2.1 The security provisions selected are:

2.1.1 Variable Construction Guarantee (yes/no)
 [14.3]

2.1.2 Fixed Construction Guarantee and Payment Reduction (yes/no)
 [14.4]

2.1.3 Advanced Payment is required. Where "Yes" Amount
 [14.5]

2.1.4 An Advance Payment Guarantee to be provided (yes/no)
 [14.5]

| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



3.0 PAYMENT AND ADJUSTMENT OF PRELIMINARIES

3.1 Payment of preliminaries

The payment of preliminaries shall be according to the option selected by the **contractor**. The amount included in each monthly **payment certificate** in respect of preliminaries as stated in the **contract data** shall be:

3.1.1 Option A

Assessed by the **principal agent** as an amount prorated to the value of the work duly executed in the same ratio as the preliminaries, bears to the **contract sum**, excluding:

- The amount for preliminaries
- Any contingency sum
- Any amount in respect of **CPAP**

All inclusive of **tax**

3.1.2 Option B

Calculated from the priced items in the **bills of quantities / lump sum document**. The **contractor** and the **principal agent** shall agree on dividing the priced preliminary items into:

- An initial or establishment charge
- A monthly charge
- A final or disestablishment charge

All inclusive of **tax**

In arriving at such a division, cognizance shall be taken of such factors as:

- Premiums for annually renewable insurance policies
- Plant, scaffolding and the like remaining the property of the **contractor** or the hiring company and the capital costs thereof not treated as part of the initial charge

Where the initial **construction period** is extended the monthly charge shall be recalculated on the same basis as was originally applied but taking into account the revised **construction period** and the amounts already paid to the **contractor**.

Should the **contractor** and the **principal agent** be unable to agree such division, then the **principal agent** shall make a division of the amount of preliminaries to be incorporated in the valuations of each monthly **payment certificate**.

3.2 Adjustment of preliminaries

The amount of items of preliminaries shall be adjusted to take account of the theoretical financial effect which changes in time and/or have value on preliminaries. Such an adjustment shall be based on the particulars provided by the **contractor** for this purpose in terms of Option A or B and shall preclude any further adjustment of preliminaries.

Adjustment of preliminaries in terms of Options A or B shall apply notwithstanding the actual employment of resources by the **contractor** in the execution of the **works**. The adjustment of preliminaries shall be based on the options as selected in the **contractor's tender**.

| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



For the adjustment of the preliminaries, both the **contract sum** and the **contract value** shall exclude:

- The amount of preliminaries
- Any contingency sum
- Any amount in respect of **CPAP**

All inclusive of **tax**

3.2.1 **Option A**

The amount of preliminaries shall be adjusted in the following categories:

- An amount which shall not be varied
- An amount which shall be varied in proportion to the **contract value** as compared with the **contract sum**
- An amount which shall be varied in proportion to the **construction period** as compared to the initial **construction period** excluding revisions to the **construction period** for which the **contractor** is not entitled to adjustment of the **contract value** in terms of the **agreement**

The **contractor** shall, within fifteen (15) working days of taking possession of the **site**, give the **principal agent** a breakdown, subdivided into the above categories, of the amount for preliminaries in tabulated form, all to the satisfaction of the **principal agent**.

Should the **contractor** fail to provide such information within the period stipulated, then the amount for preliminaries shall be deemed to be subdivided into the following proportions:

- 10% (ten percent) which amount shall not be varied
- 15% (fifteen percent) which amount shall be varied in proportion to the **contract value** as compared with the **contract sum**
- 75% (seventy-five percent) which amount shall be varied in proportion to the **construction period** as compared with the initial **construction period**

For a lump sum document, should the contractor fail to identify the amount for preliminaries, then such an amount shall be deemed to be 7,5% (seven and a half percent) of the contract sum excluding:

- Any contingency sum
- Any amount in respect of **CPAP**

All inclusive of **tax**

Where sectional completion is required in terms of the agreement, the contractor shall provide the **principal agent** with the division of the above categorised amounts into sections. Should the **contractor** fail to provide such information within the period stipulated, the categorised amounts shall be prorated to the value of each section.

3.2.2 **Option B**

The **contractor** shall, within fifteen (15) **working days** of taking possession of the site, provide the **principal agent** with a detailed breakdown of the amount for preliminaries. This breakdown shall set out, among others, full particulars of administrative, supervisory and other personnel, plant, transport and other resources and charges included in the amount for preliminaries.

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Where sectional completion is required in terms of the **agreement**, the **contractor** shall provide the **principal agent** with details of the resources required for each section and those that are common to sections. Should the **contractor** fail to provide such information within the period stipulated, Option A shall apply.

3.2.3 Payment certificate cash flow

The **contractor** shall provide all reasonable assistance to the **principal agent** in the preparation of cash flow projections of claims for **payment certificates** where required by the **employer**. The projections shall be based on the **programme** and shall be updated as and when the **programme** requires updating. The cooperation of the **contractor** in terms of this item shall not prejudice his right to receive payment in terms of the **agreement**.

3.2.4 The **contract value** shall be adjusted according **CPAP** [3.1] (Yes / No)

3.2.5 Payment of preliminaries [3.1.1-2] (A or B)

3.2.6 Adjustment of preliminaries [3.2.1-2] (A or B)

4.0 EMPLOYER CHANGES TO JBCC STANDARD DOCUMENTS

4.1 Changes (if any) in terms of the Employer’s Contract Data are accepted [3.11]. Where “no” an addendum referenced to this clause is to be attached (Yes / No)

5.0 THE TENDER

5.1 This tender is to be submitted to the principal agent at the street address provided in the invitation to tender before the tender closing date and time stated herein.

5.2 By the submission of this tender to the **employer**, the tenderer offers and agrees to contract for, execute and complete the **works** for the tender sum as stated below.

5.3 Tenders will be opened in public directly after the stated closing time. Only the total tender sum as stated in each tender will be announced.

5.4 The lowest or any tender will not necessarily be accepted.

5.5 This tender shall remain in full legal force for **ninety (90) calendar days**. The tenderer accepts liability for damages as may be suffered by the **employer** should the tender validity period not be honoured.

5.6 This tender takes into account all listed items [4.0] for the purpose of preparing and submitting this tender.

5.7 The successful tenderer will be appointed in terms of the JBCC Principal Building Agreement.

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



| 5.8 | TENDER SUM COMPILATION | Amount |
|-------|---|--|
| 5.8.1 | Tenderer's work including prime cost amounts | R <input style="width: 150px; height: 20px;" type="text"/> |
| 5.8.2 | Employer allowances stated by the principal agent | R <input style="width: 150px; height: 20px;" type="text"/> |
| 5.8.3 | SUBTOTAL | R <input style="width: 150px; height: 20px;" type="text"/> |
| 5.8.4 | Add tax on 5.8.3 | R <input style="width: 150px; height: 20px;" type="text"/> |
| 5.8.5 | TOTAL TENDER SUM inclusive of tax | R <input style="width: 150px; height: 20px; border: 3px double black;" type="text"/> |
| 5.8.6 | Tender Sum in words | |

Thus, done and signed at _____ on _____

 Name of Signatory

 Capacity of authorised signatory

 As witness

 for and on behalf of the tenderer who warrants
 authorisation hereto

| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



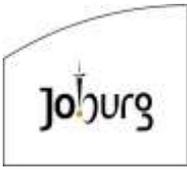
CONTRACT NO. JW14471

**RENOVATIONS AT NORTHERN WORKS LABORATORY AND FLOW
LABORATORY**

VOLUME 1

PART 1.3: FORMS AND SECURITIES

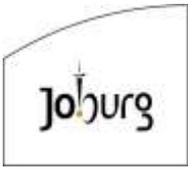
| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



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| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



C1.3 FORMS AND SECURITIES

FORMS FOR COMPLETION BY THE CONTRACTOR

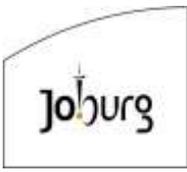
THE FOLLOWING FORMS ARE TO BE COMPLETED BY THE CONTRACTOR AFTER THE TENDER HAS BEEN AWARDED TO THE SUCCESSFUL TENDERER

- 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

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

GUARANTEE REFERENCE NUMBER: [*]**

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

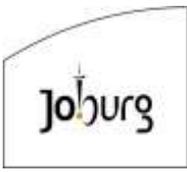
And whereas the Contract requires the Contractor to provide to the Employer an on-demand performance guarantee for the due and proper performance by the Contractor of its obligations in terms of the Contract.

Now therefore:

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

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

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Section C1 Forms and Securities

2. To pay to the Employer the Guaranteed Amount or the full outstanding balance upon receipt of a first written demand from the Employer to the Guarantor emailed to calling up this Performance Guarantee, such demand stating that:
 - 2.1. The Contract has been terminated due to the Contractor's default and that this Performance Guarantee is called up in terms of 2; or
 - 2.2. A provisional or final sequestration or liquidation court order has been granted against the Contractor and that the Performance Guarantee is called up in terms of 2; and
 - 2.3. The aforesaid written demand is accompanied by a copy of the notice of termination and/or the provisional/final sequestration and/or the provisional liquidation court order.

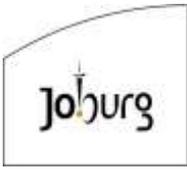
3. To pay to the Employer on demand any sum or sums not exceeding the Guaranteed Amount on presentation of a written demand signed by the Employer (the "**Demand**"), supported by a written statement signed by the Employer certifying that the Contractor, in the opinion of the Employer as at the date of issue of such Demand, is in breach of its obligations under the Contract or that a defect had occurred following the performance by the Contractor of its obligations under the Contract, and without being required to prove or set out the nature of any such breach or defect.

4. Payment by the Guarantor in terms of 1 to 3 shall be made within seven (7) calendar days upon receipt of the first written demand to the Guarantor.

5. The Guarantor hereby acknowledges that:
 - 5.1. Any reference in this Performance Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create a suretyship;
 - 5.2. Its obligation under this Performance Guarantee is restricted to the payment of money.

6. The Employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer may deem fit and the Guarantor shall not have

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Section C1 Forms and Securities

the right to claim his release from this Performance Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.

- 7. Neither the failure of the Employer to enforce strict or substantial compliance by the Contractor with its obligations under the Contract nor any act, conduct or omission by the Employer prejudicial to the interests of the Guarantor will discharge the Guarantor from liability under this Guarantee.
- 8. This Performance Guarantee, with the required demand notices in terms of 1 to 3, shall be regarded as a liquid document for the purpose of obtaining a court order.
- 9. This Performance Guarantee is neither negotiable nor transferable.
- 10. The Guarantor's period of liability shall be from and including the date of issue of this Performance Guarantee and up to and including the date on which the Certificate of Completion of the Works has been issued or payment in full of the Guaranteed Sum, whichever occurs first. The Engineer and/or the Employer shall advise the Guarantor in writing of the date on which the Certificate of Completion of the Works has been issued.
- 11. The Guarantor chooses the physical address [**insert the full physical address**] care of [**insert the full names**], as well as the e-mail address, for the service of all notices for all purposes in connection herewith.
- 12. This Guarantor is governed by the laws of the Republic of South Africa and any dispute arising hereunder shall be subject to the jurisdiction of the South African courts. In respect of such proceedings, each of the Parties specifically consents to the non-exclusive jurisdiction of the High Court of South Africa (Gauteng Local Division, Johannesburg).

Signed at for and on behalf of

Guarantor's signatory (1)

Name:

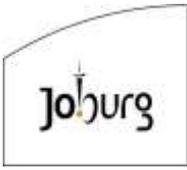
Designation:

Guarantor's signatory (2)

Name:

Designation:

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



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

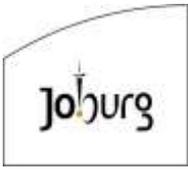
_____ on the

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

As witnesses

1. _____

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Section C1 Forms and Securities

Name & Surname

Signature

2.

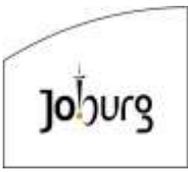
Name & Surname

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 _____

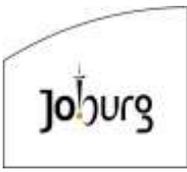
Signature on behalf of mandatory _____

Signature on behalf of Employer _____

Compensation Fund Registration No. of mandatory _____

Good Standing Certificate : yes no (tick one box)

| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Volume 1 Tender and Contract

Section C1 Forms and Securities

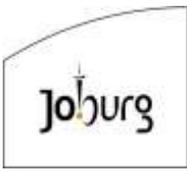
C1.3.4 Health and Safety Contract: General Information

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 mandatary.
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 mandatary 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 **JW14471: RENOVATIONS AT NORTHERN WORKS LABORATORY AND FLOW LABORATORY**
11. The area in which the work is to be conducted is **NORTHERN WORKS LABORATORY – DIEPSLOOT, JOHANNESBURG AND FLOW LABORATORY – JOHANNESBURG WATER FFENNEL DEPOT, 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.

C1.3.4.1 Occupational Health and Safety Indemnity Undertaking

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

| | | | |
|------------------|--|--------------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Section C1 Forms and Securities

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: | |

Johannesburg Water SOC Ltd



VOLUME 1

PART C2: PRICING DATA

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



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|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



C2 PRICING DATA

C2.1 PRICING INSTRUCTIONS

2.1.1 STANDARD SYSTEM OF MEASURING WORK

The Bills of Quantities have been drawn up in accordance with the Standard System of Measuring Building Work (as amended) published and issued by the Association of South African Quantity Surveyors (Sixth Edition (Revised)), 1999. Where applicable the:

- a) Civil engineering work has been drawn up in accordance with the provisions of the latest edition of SABS 1200 Standardized Specifications for Civil Engineering Works.
- b) Mechanical work has been drawn up in accordance with the provisions of the Model Bills of Quantities for Refrigeration, Air-Conditioning and Ventilation Installations, published by the South African Association of Quantity Surveyors, July 1990).
- c) Electrical work has been drawn up in accordance with the provisions of the Model Bills of Quantities for Electrical Work, published by the South African Association of Quantity Surveyors, (July, 2005).

2.1.2 JBCC SERIES 2000 PRINCIPAL BUILDING AGREEMENT

The agreement is based on the JBCC Series 2000 Principal Building Agreement, prepared by the Joint Building Contracts Committee, Edition 5.0, and July 2007. The additions, deletions and alterations to the JBCC Principal Building Agreement as well as the contract specific variables are as stated in the Contract Data. Only the headings and clause numbers for which allowance must be made in the Bills of Quantities are recited.

2.1.3 PRELIMINARY AND GENERAL REQUIREMENTS

Preliminary and general requirements are based on the various parts of the JBCC Series 2000 Preliminaries as prepared by the Joint Building Contracts Committee, Edition 5.0, and July 2007. The additions, deletions and alterations to the various parts of the JBCC Series 2000 Preliminaries as well as the contract specific variables are as stated in the Specification Data in the Scope of Work. Only the headings and clause numbers for which allowance must be made in the Bills of Quantities are recited.

2.1.4 ACTS, ORDINANCES, REGULATIONS, BY-LAWS, INTERNATIONAL AND NATIONAL STANDARDS

It will be assumed that prices included in the Bills of Quantities are based on Acts, Ordinances, Regulations, By-laws, International Standards and National Standards that were published 28 days before the closing date for tenders. (Refer to www.stanza.org.za or www.iso.org for information on standards).

2.1.5 PRICES AND RATES

The prices and rates in these Bills of Quantities are fully inclusive prices for the work described under the items. Such prices and rates cover all costs and expenses that may be required in and for the execution of the work described in accordance with the provisions of the Scope of Work, and shall cover the cost of all general risks, liabilities, and obligations set forth or implied in the Contract Data, as well as overhead charges

| | | | |
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| Employer: | | Contractor: | |
| Witness: | | Witness: | |



and profit. These prices will be used as a basis for assessment of payment for additional work that may have to be carried out.

2.1.6 DRAWINGS

The drawings listed in the Scope of Works used for the setting up of these Bills of Quantities are kept by the quantity surveyor and can be viewed at any time during office hours up until the completion of the works.

Unless otherwise stated, items are measured in accordance with the drawings, and no allowance is made for waste.

2.1.7 TYPE AND MANUFACTURED SPECIFIED PRICES

Tenderers are advised that their prices for articles described by trade names or catalogue references must be based upon the type and manufacture specified in these Bills of Quantities.

Where articles other than the manufacture specified are to be used, an adjustment of the prices will be made and Contract Instructions issued to cover these adjustments.

Substitution will be strictly subject to the Principal Agent approval.

2.1.8 RATES CONTAINED IN BILLS OF QUANTITIES

The rates contained in the Bills of Quantities will apply irrespective of the final quantities of the different classes and kinds of work actually executed.

2.1.9 RATES FOR WORK OF SIMILAR DESCRIPTION

Rates for work of similar description occurring in different sections of the Bills of Quantities shall be identical.

2.1.10 NON-COMPLETION OF PRICES

An item against which no price is entered will be considered to be covered by the other prices or rates in the Bills of Quantities. A single lump sum will apply should a number of items be grouped together for pricing purposes.

2.1.11 NON-RELEVANT ITEMS

Where any item is not relevant to this specific contract, such item is marked N/A (signifying “not applicable”)

2.1.12 CONTRACT DATA

The Contract Data and the standard form of contract referenced therein must be studied for the full extent and meaning of each and every clause set out in Section 1 (Preliminary and General) of the Bills of Quantities.

The tenderer is to acquaint himself as to the specific requirements of this tender as contained in additional clauses A1 to A6 to the JBCC Principal Agreement as incorporated in the Contract Data. These clauses may be priced under the relevant Preliminaries items in SECTION C: SPECIFIC PRELIMINARIES of the Preliminaries

| | | | |
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| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Bill. No claim will be entertained due to the failure of the tenderer to allow for these requirements.

2.1.13 ORDERING OF MATERIALS

The Bill of Quantities is not intended for the ordering of materials. Any ordering of materials, based on the Bills of Quantities, is at the Contractor's risk.

2.1.14 AMOUNT OF PRELIMINARIES AND GENERAL

The amount of the Preliminary and General Section to be included in each monthly payment certificate shall be assessed as an amount prorated to the value of the work duly executed in the same ratio as the preliminaries bears to the total of prices excluding any contingency sum, the amount for the Preliminary and General Section and any amount in respect of contract price adjustment provided for in the contract.

2.1.15 EXTENSION OF THE INITIAL CONTRACT PERIOD

Where the initial contract period is extended, the monthly charge shall be calculated on the basis as set out in 14 but considering the revised period for completing the works.

2.1.16 ADJUSTMENTS OF THE PRELIMINARIES AND GENERAL

The amount or items in the Preliminary and General Section shall be adjusted to take account of the theoretical financial effect which changes in time or value (or both) have on this section. Such adjustments shall be based on adjustments in the following categories as recorded in the Bills of Quantities:

- a) an amount which is not to be varied, namely Fixed (F)
- b) an amount which is to be varied in proportion to the contract value, namely Value Related (V); and
- c) an amount which is to be varied in proportion to the contract period as compared to the initial construction period excluding revisions to the construction period for which no adjustment to the contractor is not entitled to in terms of the contract, namely Time Related (T).

Where no provision is made in the Bills of Quantities to indicate which of the three categories in 12 apply or where no selection is made, the adjustments shall be based on the following breakdown:

- a) 10 percent is Fixed;
- b) 15 percent if Value Related
- c) 75 percent is Time Related.

The adjustment of the Preliminary and General Section shall apply notwithstanding the actual employment of resources in the execution of the works. The contract value used for the adjustment of the Preliminary and General Section shall exclude any contingency sum, the amount for the Preliminary and General Section and any amount in respect of contract price adjustment provided for in the contract. Adjustments in respect of any staged or sectional completion shall be prorated to the value of each section.

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



2.1.17 LABOUR-INTENSIVE METHODS

All work is to be constructed using labour-intensive methods. The use of plant to provide such works, other than plant specifically provided for in the scope of works, is a variation order to the contract

Payment for items, which are designated to be constructed under labour-intensively, will not be made unless they are constructed using labour-intensive methods. Any unauthorized use of plant to carry out work which was to be done labour-intensively will not be condoned and any works so constructed will not be certified for payment.

2.1.18 MODEL PREAMBLES FOR TRADES

The Model Preambles for Trades (1999 edition) as published by the Association of South African Quantity Surveyors shall apply and shall be deemed to be incorporated herein.

The Tenderer is referred to the abovementioned document for the full description of materials to be used and work to be executed.

Where variations and/or additions to the Model Preambles differ from Clauses contained in the "Model Preambles for Trades", the variations and/or additions to the Model Preambles shall take precedence.

2.1.19 MODEL BUILDING SPECIFICATIONS AND STANDARDS GUIDE

The Model Building Specifications & Standards Guide where used in these Bills of Quantities and must be read with the Bills of Quantities and Drawings.

The Tenderer's tender must take account of and include for all the obligations, requirements, specifications and standards given in the said Model Building Specifications & Standards Guide.

Where ambiguities appear between the Drawings, Bills of Quantities and the Model Building Specifications the Model Building Specifications shall take precedence.

2.1.20 ALTERATIONS, ERASURE, OMISSIONS OR ADDITIONS TO BOQ

No alterations, erasure, omission or addition is to be made in the text and conditions of these Bills of Quantities and should any such alterations, amendments, note or addition be made, the same will not be recognised, but the reading of these Bill of Quantities as prepared by the Quantity Surveyor will be adhered to.

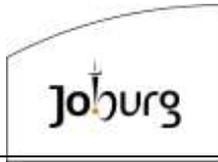
The Contractor is warned that should he use any quantities appearing in these Bills of Quantities for the purpose of ordering material, he does so at his own risk and no liability whatsoever will be admitted by the Employer or Quantity Surveyor for the correctness of such Quantities.

The Bill of Quantities shall be completed by hand in BLACK INK.

2.1.21 PRIME COST AMOUNTS AND PROVISIONAL SUMS

All Prime Cost Amounts and Budgeting included in these Bills of Quantities are NET, i.e. no cash discount to the Contractor is included.

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



2.1.22 SABS SPECIFICATIONS

All references in these Bills of Quantities to Specifications of the Bureau of Standards shall be deemed to be reference to the latest issues of such Specifications, and any subsequent amendments thereto. All articles, materials or items described as to conform to the SABS Specifications must bear the SABS mark.

2.1.23 VALUE ADDED TAX

The Tender price must include for Value Added Tax (VAT). All rates in these bills of quantities must, however, be net with VAT calculated and added to the total value thereof in the Final Summary.

2.1.24 PRICED BILLS OF QUANTITIES

Completed Bills of Quantities are to be included as part of Pricing Data and must be duly completed and returned with the Tender form. Please note that failure to complete and return the Priced Bills of Quantities shall invalidate the Tender.

2.1.25 TRAINING OF LABOUR

Training of Labour by the main Contractor will be compulsory and the Contractor is to allow for the training under Item 1 Preliminaries & General in the Bill of Quantities.

2.1.26 UNITS OF MEASUREMENT

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

| | | | |
|----------------|--------------|----------|-----------------|
| mm | millimetre | kg | kilogram |
| m | metre | t | ton (1 000 kg) |
| km | kilometre | No. | Number |
| m ² | square metre | Sum | Lump sum |
| ha | hectare | PC Sum | Prime Cost sum |
| m ³ | cubic metre | Prov Sum | Provisional sum |
| ℓ | litre | % | Percent |
| kℓ | kiloliter | kW | kilowatt |
| mPa | megapascal | | |

2.1.27 PROVIDED PREVIOUSLY

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

However, where applicable the Contractor shall:

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

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

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



2.1.28 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.

2.1.29 CONFINED SPACE

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

2.1.30 FAILURE TO SUBMIT REPORTS AND ASSOCIATED VISUAL MEDIA

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

2.1.31 SECURITY

The Contractor shall have been deemed to have included all security related costs in the Preliminary and General item rates.

2.1.32 PAYMENT ONLY FOR WORKS COMPLETED

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

2.1.33 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 Principal 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 (compacting) 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.

2.1.34 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,

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



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.

Descriptions (prices) of formwork to soffits shall be deemed to include propping.

2.1.35 PLASTERING AND IN-SITU FINISHES

Descriptions (prices) of plaster and other in-situ finishes shall be deemed to include the necessary preparatory work and working around pipes, balusters, etc. Plastering described as "on walls" is on brick walls or block walls unless otherwise stated and shall include plaster on concrete columns, beams and lintels flush with the face of the wall.

2.1.36 HEALTH AND SAFETY

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

No payment shall be applicable where equipment is not provided and services are not rendered in terms of the approved Health and Safety Plan. Additionally, the Contractor shall also be penalised in terms of Clause (30) of the Occupational Health and Safety Act 183 (1993), Construction Regulations (2003).

2.1.37 COMPILE HEALTH AND SAFETY PLAN

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

2.1.38 IMPLEMENTATION OF HEALTH AND SAFETY PLAN

The rate shall include the complete cost for the provision of resources (human and equipment), communication, transportation and travelling, documentation of activities and reporting activities required to fully comply with the implementation and maintenance of the Health and Safety Plan.

2.1.39 EMP IMPLEMENTATION AND MAINTENANCE

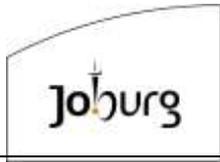
The rate shall include the complete cost for the provision of resources (human and equipment), communication, transportation and travelling, documentation of activities and reporting activities required to fully comply with the implementation and maintenance of the EMP contained in Volume 2 for the duration of the Contract.

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

2.1.40 SUB-CONTRACTED WORK

A particular portion of the works has been allocated for completion by an appointed SMME, as per the Scope of Works.

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |



This portion of works have costs assigned to the identified works. In the event that the contractor is to intervene and complete works on behalf of the SMME during the construction period, the contractor will be bound by those rates.

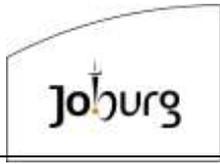
However if the Contractor deems the allocated rates to be insufficient the contractor may submit an alternative offer – however this offer will be considered as the contractors offer and will be utilised during evaluation.

The Contractor however may not reduce the rates as provided in the tender document. Further an allowance has been made (which is limited to 10% of the SMME portion of the Works) 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

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.

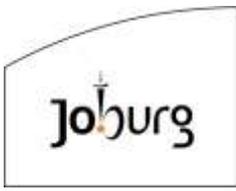
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| Employer: | | Contractor: | |
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C2.2 BILL OF QUANTITIES

Note: The Bills of Quantities are sequentially numbered and page numbering coincides with the Tender document page numbering.

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Johannesburg Water SOC Ltd



JW14471

RENOVATIONS AT NORTHERN WORKS LABORATORY AND FLOW LABORATORY

VOLUME 2

PART 3: SCOPE OF WORK



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| Employer: | | Contractor | |
| Witness: | | Witness: | |



Contract JW14471
**RENOVATIONS AT NORTHERN WORKS LABORATORY
 AND FLOW LABORATORY
 SCOPE OF WORK**



PART C3 SCOPE OF WORK

GENERAL

This section specifies and describes the supplies, services 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

The Scope of the Work is set out in two portions:

Portion 1: PROJECT SPECIFICATION covers a general description of the project, the facilities available and the requirements to be met.

Portion 2: VARIATIONS AND ADDITIONS TO THE STANDARDISED SPECIFICATIONS covers variations to the standardized specifications and particular specifications, which are applicable to the contract.

Should any requirement of the Project Specification conflict with any requirement of the standardized or particular specifications, the requirements of the Project Specifications shall prevail.

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.

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Contract JW14471
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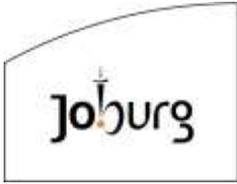
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PORTION 1: PROJECT SPECIFICATION

PS 1 DESCRIPTION OF THE WORKS

PS 1.1 EMPLOYER’S OBJECTIVES

The objective of this contract is to renovate the laboratory at Northern Works in Diepsloot and the one at the Flow laboratory located at Johannesburg FFennell Depot.

This will be achieved by engaging a Contractor with a CIDB grading of **6GB or higher** as the main contractor.

PS 1.2 BACKGROUND OF THE PROJECT

The project scope of work covers the following:

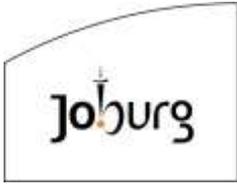
- Sealing of the leaking concrete water sump at the flow laboratory.
- Renovation of the Northern Works laboratory.

PS 1.3 OVERVIEW OF THE WORKS

1. Sealing of the leaking concrete water sump at the flow laboratory

- The concrete water sump must be repaired and sealed to prevent water leakage;
- The damaged concrete internal walls must be repaired then sealed to prevent water leakage;
- Ancillary works within the flow laboratory must be sealed to prevent water leakage;
- The drainage system must be improved in order to allow water to drain efficiently;
- A larger storm water manhole and 600mm diameter concrete storm water pipeline is required to efficiently drain the water away from the building;
- The brick water channel must be relined with concrete and waterproofed to prevent water ingress;
- The underground overflow openings and channels were checked for leakages and must be sealed and waterproofed to prevent water ingress;
- A subsoil drainage system is required on one of the outer walls on the water sump;
- Repair to the steel works in the flow laboratory is required as well.

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| Employer: | | Contractor: | |
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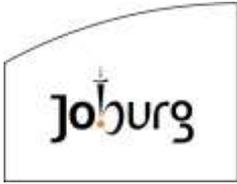
Contract JW14471
RENOVATIONS AT NORTHERN WORKS LABORATORY
AND FLOW LABORATORY
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2. Renovation of the Northern Works laboratory

- Changing laboratory normal doors to sliding doors;
- Changing of the computer room door from normal door to sliding door;
- Changing of the computer room to a kitchen;
- Installation of new cabinets and fume hoods including double sink to all laboratory rooms including the wash room;
- Inclusion of the cold room in the storeroom area;
- Installation of an access door that also acts as a fire door and is linked to the access control system;
- Changing of the instrument research room to laboratory staff office;
- Changing of the instrument research room door into a normal door
- Change the balance room to sample receival room with inclusion of a sliding door;
- Change the balance room from its current location to sampler bottle area;
- Moving the safety shower to the main laboratory;
- Four aircons in the laboratory;
- Three aircons in the offices;
- Raised floor in the laboratory needs to be changed;
- LED lights with motion sensors;
- Furniture as per JW specifications in the offices, kitchen and laboratory;
- Installation of an alarm system in the laboratory as a security measure;
- Outside lighting to enhance visibility;
- Burglar bars on windows.

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Contract JW14471
RENOVATIONS AT NORTHERN WORKS LABORATORY
AND FLOW LABORATORY
SCOPE OF WORK



PS 1.3 SCOPE OF WORKS

PS 1.3.1 SCOPE OF WORKS

PS 1.3.1.1 SUMMARY OF WORKS

The scope of works can be summarised as follows, but may not be limited to:

- General building works
- Carpentry
- Civil works
- Concrete works
- Structural works
- Electrical works
- Plumbing works
- HVAC works
- IT installation works
- Fire equipment works
- New furniture
- Steel works
- Alarm system
- Access control system
- Burglar bars
- Waterproofing
- Concrete sealing to prevent water leakage

PS 1.4 LOCATIONS OF THE WORKS

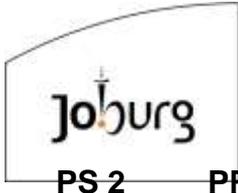
The works is at two (2) different locations.

1. Johannesburg Water Ffennell Depot located at Robinson 82 – IR
Johannesburg, 2001
2. Johannesburg Water Northern Works Treatment Plant located in Diepsloot,
Johannesburg.

PS 1.5 TEMPORARY WORKS

No Temporary works are envisaged under this contract.

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Contract JW14471
**RENOVATIONS AT NORTHERN WORKS LABORATORY
 AND FLOW LABORATORY
 SCOPE OF WORK**



PS 2 PRINCIPAL AGENT

PS 2.1 EMPLOYER’S DESIGN

When and where specific reference is made or preference given to specified material, the Tenderer shall include such as his main offer in the tender. Should the Tenderer fail to comply with these requirements, this may lead to the disqualification of the tender submitted.

Tenderers are free to propose alternative material to that proposed by the principal agent and, provided that technical data sheets with details of each alternative proposal are submitted with the tender, such alternative proposals will be considered in the adjudication of a tender. Full details of any changes must be included with the tender. The cost of any changes to the existing design will be for the Contractor’s account where full details of the changes were not submitted with the tender.

Where material other than that proposed by the principal agent is accepted, it will be the sole responsibility of the Contractor to ensure repair work is compatible with the accepted material.

In case of the principal agent’s acceptance of an alternative proposal, the Contractor shall submit in triplicate to the Engineer 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 principal agent’s approval of such alternatives, shall not be considered.

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

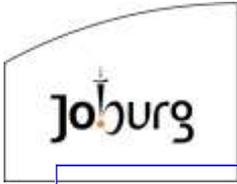
PS 2.2 DRAWINGS

PS 2.2.1 VOLUME 4

The drawings that are issued for **TENDER PURPOSES** are those attached as Volume 4.

The drawing register is shown below:

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |

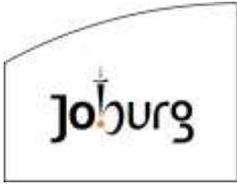


**Contract JW14471
 RENOVATIONS AT NORTHERN WORKS LABORATORY
 AND FLOW LABORATORY
 SCOPE OF WORK**



| DRAWING REGISTER | | | |
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| PROJECT NAME: RENOVATIONS AT NORTHERN WORKS LABORATORY AND FLOW LABORATORY | | | |
| PROJECT NO. : JW14471 | | | |
| PROJECT STATUS: TENDER | | | |
| RENOVATIONS AT NORTHERN WORKS LABORATORY AND FLOW LABORATORY LIST OF DRAWINGS | | | |
| TITLE OF DRAWINGS | PROJECT NUMBER | DRAWING NUMBER | REVISION |
| 1. ARCHITECTURAL DRAWINGS | | | |
| 1.1 NORTHERN WORKS | | | |
| RENOVATIONS AT NORTHERN WORKS LABORATORY | JW14471 | ARCH-01 | 0 |
| 2. STRUCTURAL DRAWINGS | | | |
| 2.1 FLOW LABORATORY | | | |
| CONCRETE SUMP, CHANNELS, PIPELINE LAYOUT, SECTIONS & DETAILS | JW14471 | STRUCT-01 | 0 |
| STORMWATER LAYOUT & DETAILS | JW14471 | STRUCT-02 | 0 |
| MEZZANINE STEEL STRUCTURE LAYOUT, ELEVATION & DETAILS | JW14471 | STRUCT-03 | 0 |
| 3. NAME BOARD | | | |
| 3.1 FLOW LABORATORY | | | |
| NAME BOARD | JW14471 | STRUCT-04 | 0 |
| NAME BOARD FRAME DETAILS | JW14471 | STRUCT-05 | 0 |
| 3.2 NORTHERN WORKS | | | |
| NAME BOARD | JW14471 | STRUCT-06 | 0 |
| NAME BOARD FRAME DETAILS | JW14471 | STRUCT-07 | 0 |

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| Witness: | | Witness: | |



Contract JW14471
RENOVATIONS AT NORTHERN WORKS LABORATORY
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PS 2.2.2 CONSTRUCTION DRAWINGS

Upon receiving the instruction to commence with the Works 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. The latter shall be:

- a) made available to the Employer’s Agent or his duly authorised representative within 24 hours on request;
- b) submitted to the Employer’s Agent with the Contractor’s request for issue of the Practical Completion Certificate.

PS 2.3 INFORMATION SUPPLIED BY EMPLOYER

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

PS 2.4 DESIGN SERVICE AND ACTIVITY MATRIX

- a) The Employer is responsible for the design of the permanent Works as reflected in the Contract Document unless otherwise stated.

PS3 PROCUREMENT

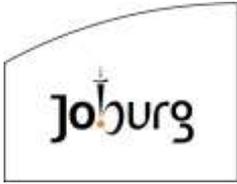
PS 3.1 PREFERENTIAL PROCUREMENT PROCEDURES

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

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

These schedules contain all requirements with regard to preferential procurement.

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Contract JW14471
**RENOVATIONS AT NORTHERN WORKS LABORATORY
 AND FLOW LABORATORY
 SCOPE OF WORK**



PS 3.2 SUBCONTRACTING

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

It is the intention of Johannesburg Water that the minimum targeted participation goal for the local sub-contractors is for but not limited to the full value of subcontracting works identified by the Employer as covered in the Bill of Quantities. The onus is upon the main contractor to handle and manage the procurement process of the sub-contractors.

The identified scope of work by the Employer is outlined in the Schedule of Quantities

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

1. Valid CK registration
2. CSD Registration
3. SA ID copies of owners
4. Active CIDB membership: **minimum grading TBA**
5. Valid Tax clearance certificate
6. COIDA certificate
7. Company Profile including similar experience and skilled personnel CVs
8. Health and Safety Plan

The Contractor is:

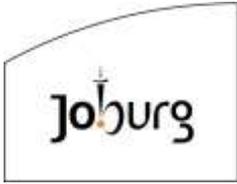
To enter into a contract with any (nominated, selected sub-contractor(s)). The number of sub-contractor(s) will be determined by the main contractor depending on the Subcontracting Scope of Work and the amount of work that is to be carried out under this Contract as outlined above and in the Bill of Quantities.

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

Note:

- **Local** subcontractors are subcontractors from within the project suburb or ward.
- **Regional** subcontractors are subcontractors from within the region as per the City of Johannesburg's demarcation of the regions.

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |



**Contract JW14471
 RENOVATIONS AT NORTHERN WORKS LABORATORY
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The Contractor shall be expected to enter into a contract with the nominated or selected subcontractor(s). The Employer must be supplied with a copy of the contract/agreement for records.

The following applies to the select sub-contractors by the main contractor and will serve as a guideline to meeting out of work to select qualified sub-contracting companies.

The sub-contractor carrying out works as per item PS 3.2.1 must be minimum **TBA** CIDB graded, for building works and works on structures.

NB: *The Engineer shall not negotiate directly with sub-contractors and all problems relating to programming, workmanship, etc., as they are matters between the Contractor and his sub-contractors.*

In the execution of the Subcontract Work, the Contractor shall ensure that the Subcontractor(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.

PS 3.2.1 PERFORMANCE AND EXECUTION OF THE SUBCONTRACT WORK

The main contractor must ensure that his subcontractors shall supply sufficient, suitable resources (e.g. equipment, labour, material) to execute all the Subcontract Work including the portion identified by the Employer as outlined in the Scope of Work PS 3.2 and Bill of Quantities.

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

PS 3.2.2 QUALITY OF THE SUBCONTRACT WORK

It is the responsibility of the Contractor to ensure that the Subcontractor shall be capable of executing the Subcontract Work efficiently and in accordance with the Scope of Work.

PS 3.2.3 LAWS AND REGULATIONS

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,

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Contract JW14471
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PS 3.2.4 RESOURCES TO COMPLETE SUBCONTRACT WORK

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

PS 3.2.5 PAYMENT

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

PS 3.2.6 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 3.2.7 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.

PS 3.3 PARTICIPATION OF TARGETED LABOUR

PS 3.3.1 Minimum Targeted Labour Contract Participation Goal

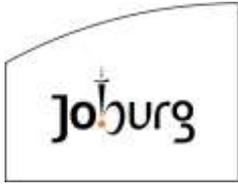
In support of the National Department of Public Works' Expanded Public Works Programme which is aimed at the alleviation of poverty through the creation of employment opportunities, the Employer is seeking to increase the intensity of labour, as appropriate, in all of its infrastructure sector projects.

It is a requirement of this contract, therefore, that the work be executed in such a manner so as to maximise the use of labour-intensive construction methods in order to provide low and semi-skilled employment opportunities.

To this end, a minimum targeted labour contract participation goal is specified below, which shall be achieved by the Contractor in the performance of the contract, failing which, penalties as described will be applied.

The specified minimum targeted labour Contract Participation Goal (CPGL) is **100%** for all brick laying and roof tiling in the project.

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |



**Contract JW14471
 RENOVATIONS AT NORTHERN WORKS LABORATORY
 AND FLOW LABORATORY
 SCOPE OF WORK**



PS 3.3.2 Definitions

For the purposes of the requirements in respect of the participation of targeted labour, the following definitions shall apply:

“Target area” means the geographical area shown on plan in Part C4: Site Information

“Targeted labour contract participation goal (CPGL)” means the sum of the wages (excluding any benefits), for which the Contractor, or any of his/her subcontractors contracts targeted labour in the performance of the contract, expressed as a percentage of the value of the contract.

“Targeted labour” means low and semi-skilled individuals, whose wages (excluding any benefits) do not exceed the threshold value, who reside in the target area, that are employed by the Contractor, or any of his/her subcontractors, in the performance of the contract.

“Threshold value” is R200.00 per day. The threshold value is not to be confused with any industry sector minimum wage determined in accordance with the Basic Conditions of Employment Act, No. 75 of 1977.

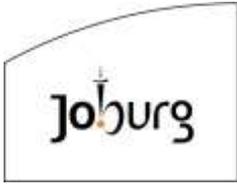
“Value of the contract” means the contract sum (accepted contract amount) less provisional sums, contingencies and VAT.

PS 3.3.3 The Selection and Recruitment of Targeted Labour

Where targeted labour is to be drawn from specific local communities (defined in terms of the target area), such labour shall be identified using the relevant Sub-Council Job-Seekers Database. The Contractor shall request, via a Community Liaison Officer (if required in terms of the contract), a list of suitable candidates from the database, from which the Contractor shall make his/her final selection. The contractor shall enter into written contracts of temporary employment with all targeted labour.

Any difficulty experienced by the Contractor in identifying candidates though the Job-Seekers Database, or as regards any matter relating to the employment of targeted labour, shall be immediately referred to the Principal Agent.

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| Employer: | | Contractor: | |
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Contract JW14471
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PS 3.3.4 Contract Participation Goal Credits

Credits towards the achieving the minimum CPG_L shall be granted by converting the total monetary value of wages paid to targeted labour to a percentage of the value of the contract. No credits shall be awarded should the contractor fail to enter into written contracts with the targeted labour. Furthermore, no credits shall be awarded in respect of targeted labour employed on work in respect of provisional sums or prime cost items. Such labour shall nevertheless be recorded on the Project Labour Report which is required to be furnished by the Contractor.

In addition to the forms required for contract administration (the Project Labour Report and Targeted Labour Contract Participation Expenditure Report, in particular), the Contractor shall furnish the Principal Agent with copies of the employment contracts entered into with targeted labour, as well as evidence of payments to such labour in the form of copies of payslips or payroll runs.

PS 3.3.5 Training of Targeted Labour

The Contractor is required to provide all informal (on-the-job) skills training so as to ensure that a minimum level of competence is achieved and maintained, such that the various activities are carried out safely and to the required standard. The cost of informal training shall be included in the rates for the various work activities.

PS 3.3.6 Penalties

The financial penalty to be applied for failing to meet the specified minimum targeted labour contract participation goal in the performance of the contract (unless proven to be beyond the control of the Contractor), is as follows:

$$\text{Penalty} = (\text{CPG}_L^S - \text{CPG}_L^A) \times P^*$$

Where CPG_L^S = the specified minimum targeted labour contract participation goal (expressed as a percentage).

CPG_L^A = the targeted labour contract participation goal achieved (expressed as a percentage).

P^* = the value of the contract.

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |



Contract JW14471
RENOVATIONS AT NORTHERN WORKS LABORATORY
AND FLOW LABORATORY
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PS 3.4 COMMUNITY LIAISON OFFICER

It is a requirement of this Contract that a Community Liaison Officer (CLO) shall be appointed by the Contractor. The primary functions of the CLO shall be to assist the Contractor with the selection and recruitment of targeted labour, to represent the local community in matters concerning the use of targeted labour (and/or enterprises) on the works, and to assist with and facilitate communication between the Contractor, the Principal Agent and the local communities.

The identification of suitable candidates (maximum 5; minimum 3) for the CLO position shall be resolved by the relevant Ward Councillor/s. Should suitable candidates not be identified within two weeks of the date of request, the Contractor shall be allowed to seek candidates from the relevant Sub-Council Job-Seekers Database. The final selection and appointment of the CLO in terms of the contract shall be the responsibility of the Contractor.

The period of appointment of the CLO shall be as stated in the Contract for Temporary Employment as a Community Liaison Officer referred to below. The date of commencement of temporary employment of the CLO shall be as agreed with the Principal Agent.

It is required, therefore, that the Contractor enter into a contract of temporary employment with the selected CLO, the contracting parties being the Contractor and the CLO. To this end, a specimen Form of Contract of Temporary Employment as Community Liaison Officer is included in this document (Part C1.5: Agreement and Contract Data). This Form of Contract sets out, inter alia, the agreement between the parties, the duties and conditions of employment of the CLO (including the rate of remuneration to be paid). As said contract will be between the Contractor and the CLO, all costs involved shall be borne by the Contractor and the tender shall be deemed to include for this.

PS 3.4.1 APPOINTMENT, OFFICE AND REPLACEMENT OF CLO

- The CLO will be appointed for the duration of the construction phase of this Contract.
- The CLO will occupy his own office in the Contractor’s camp from where he will fulfil his duties to identify, screen and nominate labour from the community in accordance with the Contractor’s requirements.
- The CLO will communicate with the Contractor daily regarding labour requirements.
- Should it become apparent that the appointed CLO fails to meet his duties, he may be relieved from his duties and replaced by a new CLO in consultation and approval with the Project Steering Committee.
- One CLO will be appointed per ward from the time that work starts in that ward until all work in that ward has been completed.

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| Employer: | | Contractor: | |
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Contract JW14471
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PS 3.4.2 DUTIES OF THE CLO

- He will attend all meetings of the committee pertaining to this Contract.
- He will be available on site daily between the hours of 07:30 and 18:30, and at other times as the need arises.
- He will consult with the Contractor and the Engineer daily to determine the labour requirements regarding amount and skills, to identify possible labour disputes, and to inform local labourers timeously when they will be relieved.
- He is responsible to screen candidates, to inform them of their conditions of temporary employment and to ensure their timeously availability.
- He will ensure that all workers who are involved in activities where productivity rates have been agreed, are fully informed regarding the expected level of productivity for the given tasks to be assigned as part of this Contract.
- He will attend disciplinary proceedings to ascertain that hearings are fair and reasonable.
- In consultation with the Contractor, he will determine the needs of the local labour for relevant technical training. Again, he will be responsible for the identification of suitable trainees. He will also be required to attend some of the training sessions.
- He will keep a daily written record of his interviews and community liaison.
- He will attend the first part of the monthly Contractual site meetings to report about the local community labour involvement as well as any other relevant problem that needs attention.
- He will liaise regularly with the Project Steering Committee to ensure that their co-operation is obtained and their decisions accommodated. He will thus act as a liaison officer between the Contractors on site and the local community through the project committee.
- He will be involved in all SMME related matters (Contracts, terminations etc)

PS 3.4.3 SCHEDULED ITEMS

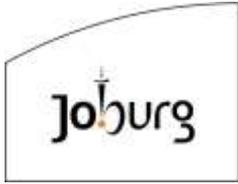
PS 3.4.3.1 *Community Liaison Officers*..... **Unit: Provisional Sum**

The tendered sum shall include full compensation for the provisions of the CLO including salary, provision of an office, transport costs, the cost of typing, printing and distributing notices, and for all other obligations described in PS3.4.2.

The Contractor must the supply the CLO with a cellular phone for the duration of the CLO employment Contract and this rate must cover the cost of procuring and commissioning that phone.

The Contractor must allow R 500,00/month per CLO for work related calls. Calls above this amount will be for the CLO account.

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**Contract JW14471
 RENOVATIONS AT NORTHERN WORKS LABORATORY
 AND FLOW LABORATORY
 SCOPE OF WORK**



PORTION 2: VARIATIONS AND ADDITIONS TO THE STANDARDISED SPECIFICATIONS

PS 4 CONSTRUCTION

PS 4.1 GENERAL CONDITIONS AND APPLICABLE STANDARD

PS4.1.1 General Conditions

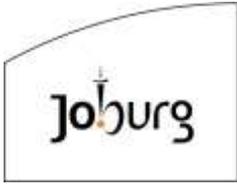
The “Special Condition of Contract” to be read in conjunction with the “General Conditions for Construction Works 2015 Third Edition (GCC 2015)..

PS4.1.2 National standards

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

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

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**Contract JW14471
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- EN 197-1 cement
- 5831 : Presence of chlorides in aggregates
- 5861-2 : Concrete tests - Sampling of freshly mixed concrete (2006)
- 5862-1 : Concrete tests - Consistence of freshly mixed concrete - Slump test (2006)
- 5863 : Concrete tests - Compressive strength of hardened concrete (2006)
- 5864 : Concrete tests - Compressive strength of hardened concrete (2006)
- 5865 : Concrete tests - The drilling, preparation, and testing for compressive strength of cores taken from hardened concrete (1994)
- 0268-1 : Welding of thermoplastics – Welding Processes
- 1476:2009 : Fabricated flanged steel pipework

Reference is made to certain provisions of:

- SANS 1921-5 Construction and management requirements for works contracts: Earthworks activities which are to be performed by hand
- SANS 1914-5 Targeted construction procurement: Participation of targeted labour

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

These Specifications are not issued with this volume but are available at the Contractor's expense from Standards South Africa:

PS 5 CIVIL ENGINEERING SPECIFICATIONS

PSA-8 MEASUREMENT AND PAYMENT

B1. SECTION 1200A: GENERAL REQUIREMENTS AND PROVISIONS

| Item | Unit |
|--|-------------|
| PSA 8.6 Prime Cost Sums | |
| a) Additional tests required by the Engineer | PC Sum |
| b) Charge required by Contractor on sub-item 8.6.a above | % |

The rate shall be prime sum for item PSA 8.6 a) and shall make provision for the procurement of a SANAS accredited laboratory to conduct testing and certification of results as instructed by the Engineer or the Engineer's representative.

The rate for item PSA 8.6 b) shall be percentage for mark-up on the prime cost and shall make full provision for the costs incurred by the Contractor in procuring and supervising the laboratory personnel.

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a) And b) shall only be used when the Engineer or his representative has given an instruction in writing to conduct such tests. Normal quality control tests done by the Contractor does not form part of this item.

| Item | Unit |
|---|-------------|
| PSA 8.8.7 Dismantling of roof structure and depose unwanted material of existing Roof structure. | Sum |

The rate shall be a cost sum and shall make full provision for the dismantling/demolishing of the existing Roof structure structure. The rate shall also include haulage of the material to spoil at a dump site chosen by the Contractor. No overhaul or dump site costs will be paid under this item as it will be deemed included in the tendered sum amount.

| Item | Unit |
|--|-------------|
| PSA 8.8.9 Application fees | |
| a) Any fees payable on behalf of the Client | Prov Sum |
| b) Extra-over item PSA 8.8.7 for handling and profit | % |

The rate shall be provisional sum and shall make full provision for paying fees on behalf of the Client. This item will be used at the sole discretion and instruction of the Engineer or his representative. Percentage mark-up for profit and attendance will cover cost incurred by the Contractor. The provisional sum will be based on actual payment made on behalf of the Client and as such proof of payment is required before the item can be claimed.

PS 6 STRUCTURAL ENGINEERING – STANDARD SPECIFICATIONS

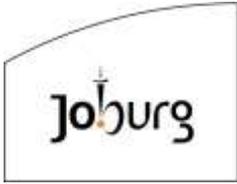
PROJECT SPECIFICATIONS

PS6.1 Brickwork

PS6.1.1 Sand

The sand shall consist of clean, hard sand, to be well graded to comply with SANS 1090. It shall be free from particles, clay, organic material and shall be screened and washed if necessary and shall comply with such tests as requested by the Engineer.

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SCOPE OF WORK



PS6.1.2 Cement

All cement shall be Portland Cement of normal setting quality in accordance with provisions and conditions of SANS 50197-1 for Portland Cement. Cement kept on site shall be stored in such a manner that it is prevented from deterioration or contamination. Any cement found to be defective shall be removed from site. The maximum storage period of cement on site shall be six (06) weeks.

PS6.1.3 Mortar Mixing

All mortars are to be mixed in a mortar-mixing machine or a non-absorbent, closed-joined platform. The platforms are to be kept clean and old mortar removed before and new batch of mortar is prepared for mixing.

PS6.1.4 Cement Mortar

Cement mortar shall comply with the requirements of Class II mortar as per Table 1 of SANS 0164-1. Unless otherwise described, shall be composed of five parts by volume of sand to one part by volume of cement for all internal walls and four parts by volume for of sand to one part by volume of cement for all external walls. Cement mortar is to be mixed in small quantities and must be used immediately as no mortar has started to set shall be used.

PS6.1.5 Bricks

Bricks shall be of best quality, hard, sound, even size and shape and equal to samples submitted to and approved by the Engineer. All load and non-load bearing bricks shall have a minimum crushing strength

of 14 MPa. Face bricks shall have a maximum water absorption of 15%. Consideration will be given to the use of cement bricks should clay bricks of adequate quality is not available.

PS6.1.6 Setting Out Accuracy

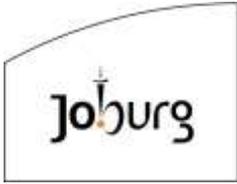
All walls, partitions, projections, openings etc., shall be carefully set out in accordance with the drawings and also checked with the overall dimensions.

The accuracy of construction shall be in accordance with SANS Code of Practice 10055-2009.

PS6.1.7 Construction of Brickwork

All brickwork shall be built in stretcher bond with brickforce every 4th Course. Only whole bricks may be used except where legitimately required for bond. The bricks shall be well wetted with water before being laid and the course laid last shall be well wetted before bedding fresh bricks upon it. All bricks

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SCOPE OF WORK



shall be carried up plump and level. The brickwork shall have joints flushed solid at every course throughout the whole width of each course and bricks shall be laid on solid bed mortar. The joints of all walls to be plastered or tiled shall be raked out as the work proceeds to form a key. All walls shall be carried up regularly so that no part is more than 1,2m higher than the adjoining wall. Mortar beds generally, unless otherwise described, shall not exceed 10mm in thickness. Ties between brick walls shall consist of every 4th course of new brick being built into existing wall by half a brick length.

PS6.1.8 Cleaning Off

Special care shall be taken to keep brickwork free from mortar droppings as the work proceeds, and at completion they shall be cleaned with approved cleaning material, such as “Mortar Lift”.

PS6.2 Roof Structure and Covering

PS6.2.1 Roof Structure

The roof structure shall be of timber construction as shown in the drawings.

The Timber members shall be mechanically graded and have a minimum grading of Grade 7. The roof trusses shall be tied down to the brickwork in accordance with the requirements of SANS 10400.

PS6.2.2 Roof Covering

Where possible, the existing concrete tiles will be used as roof covering and any replacement material should match the existing tiles.

PS6.2.3 Insulation of Roofs

Roof insulation, if required, as per the design drawings.

PS6.2.4 Ceilings

Ceilings shall be as per the drawings.

PS6.2.5 Gutters and Down Pipes

Gutters and Down pipes, if required, shall be as per the design drawings.

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RENOVATIONS AT NORTHERN WORKS LABORATORY
AND FLOW LABORATORY
SCOPE OF WORK



PS6.3 Plastering

PS2.3.1 Cement

Cement shall be ordinary Portland Cement complying with SANS 50197-1.

PS2.3.2 Lime

Lime shall be Type A2P hydrated lime complying with SANS 523.

PS2.3.3 Sand

Sand shall comply with SANS 1090 for relevant types of plaster or other in-situ finishes.

PS2.3.4 Preparatory Work

Surfaces should be clean and free of oil and thoroughly wetted directly before and plastering or other in-situ finishes commences. Concrete Preparatory coats shall be thoroughly scored and roughened to form a proper key.

PS2.3.5 Finish

All final coats of plastering shall be executed in one operation without and blemishes.
No touching up of finished work will be permitted.

PS2.3.6 Thickness of Plaster

Skim plaster shall be 6mm thick and all other plaster shall not be less than 10mm and not more than 20mm thick.

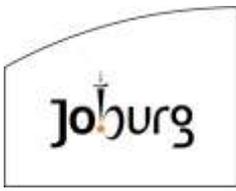
PS2.3.7 Cement Plaster

Cement plaster shall be of one part cement and five parts sand. All internal plaster shall be finished with steel trowel.

PS2.3.8 Descriptions

Descriptions for plaster and other in-situ finishes shall be deemed to include the necessary preparatory work. Plastering described as being on vertical surfaces of brickwork shall include lintels and beams flush with the face of the wall.

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Johannesburg Water SOC Ltd



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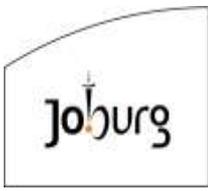
**RENOVATIONS AT THE NORTHERN WORKS
LABORATORY AND FLOW LABORATORY**

VOLUME 2

PART 4: SITE INFORMATION



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**Contract JW14471
 RENOVATIONS AT NORTHERN WORKS LABORATORY
 AND FLOW LABORATORY**

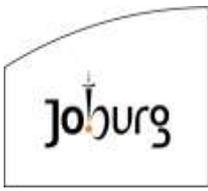


SITE INFORMATION

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| C4.2.... SITE LOCATION | 1 |
| C4.3.... ACCESS TO SITE AND RESTRICTIONS | 1 |
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SITE INFORMATION

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

There are two different sites:

1. Johannesburg Water Ffennell Depot located at Robinson 82 – IR Johannesburg , 2001
2. Johannesburg Water Northern Works Treatment Plant located in Diepsloot , Johannesburg.

C4.3 ACCESS TO SITE AND RESTRICTIONS

The flow laboratory is located at Johannesburg Water Ffennell Depot at Robinson 82 – IR Johannesburg, 2001.

The Northern Works laboratory is located at Johannesburg Water Northern Works Treatment Plant located in Diepsloot , Johannesburg in the administration block.

The Contractor may not operate any valves or any other equipment currently in use on the works without written permission from the Works Manager.

C4.4 EXISTING SERVICES, SERVITUDES AND WAYLEAVES

The Contractor shall take due care to prevent damage of existing services.

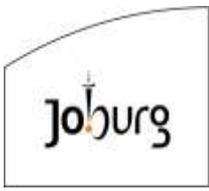
C4.5 SECURITY

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 Client in this regard will consider no claims.

C4.6 NATURE OF GROUND AND SUBSOIL CONDITIONS

It shall be the Contractor’s responsibility to acquaint himself with the conditions of the site.

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C4.7 GEOTECHNICAL REPORT AND BOREHOLE CORES

There is no geotechnical report. 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.

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RENOVATIONS AT NORTHERN WORKS LABORATORY
AND FLOW LABORATORY
Particular Specifications



Johannesburg Water SOC Ltd



CONTRACT JW14471

RENOVATIONS AT NORTHERN WORKS LABORATORY AND FLOW LABORATORY

VOLUME 2

PART 3:

SCOPE OF WORK

C3.2 PARTICULAR SPECIFICATIONS

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PREAMBLE TO SCOPE OF WORK

General

The Standard Specification for all associated civil work shall be the SANS 1200 and SANS 2001 – Standardized Specification for Civil Engineering Construction.

The Standardized Specifications applicable to this Contract are listed in the Project Specification.

These Specifications are not issued with this volume but are available at the Contractor’s expense from: SA Bureau of Standards, Private Bag X191, Pretoria, 0001.

Scope

This Project Specification is set out in three portions:

Portion 1: SCOPE OF WORK covers a general description of the project, the facilities available and the requirements to be met.

Portion 2: VARIATIONS AND ADDITIONS TO THE STANDARDISED SPECIFICATIONS covers variations to the standardized specifications and particular specifications, which are applicable to Civil, Architectural, Structural and Electrical works.

Portion 3: PARTICULAR SPECIFICATIONS covers particular specifications which are applicable to Building, Plumbing and Electrical works.

Status

Should any requirement of the Project Specification conflict with any requirement of the standardized or particular specifications, the requirements of the Project Specifications shall prevail.

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C3 SCOPE OF WORKS

C3.3 PARTICULAR SPECIFICATIONS

C3.3.1 CIVIL

- PA FENCING**
- PA 01 SCOPE
 - PA 02 TYPE OF FENCE
 - PA 03 MATERIALS
 - PA 04 CLEARING FENCE LINE
 - PA 05 INSTALLING POSTS AND STANDARDS
 - PA 06 INSTALLING WIRE
 - PA 07 INSTALLING DIAMOND MESH
 - PA 08 INSTALLING BARBED-TAPE CONCERTINAS
 - PA 09 CLOSING OPENINGS UNDER FENCES
 - PA 10 INSTALLING GATES
 - PA 11 GENERAL REQUIREMENTS AND TOLERANCES
 - PA 12 MEASUREMENT AND PAYMENT

- PD BUILDING WORK**
- PD 01 SCOPE
 - PD 02 BRICKWORK, PLASTER WORK AND FLOOR SCREEDS
 - PD 03 DOORS AND WINDOWS
 - PD 04 GLAZING
 - PD 05 CARPENTRY AND JOINERY
 - PD 06 ROOF SHEETING AND ACCESSORIES
 - PD 07 ELECTRICAL WORK
 - PD 08 PLUMBING
 - PD 09 PAINTING
 - PD 10 MEASUREMENT AND PAYMENT

ELECTRICAL

- E100 STANDARD ELECTRICAL LOW VOLTAGE SPECIFICATION**
- E100.1 GENERAL DESIGN
 - E100.2 TESTING AND COMMISSIONING
 - E100.3 LOW VOLTAGE CABLES
 - E100.4 LOW VOLTAGE SWITCHGEAR AND CONTROL GEAR ASSEMBLIES
 - E100.5 CABLE SUPPORT SYSTEMS
 - E100.6 WIRING AND OUTLETS
 - E100.7 LIGHTINIG
 - E100.8 STREET AND AREA LIGHTING

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C3.3.1.1 PA FENCING

C3.3.1.1.1 PA 01 SCOPE

This is a Particular Specification and covers the erection of new fences.

C3.3.1.1.2 PA 02 TYPE OF FENCE

The fence shall be a security fence and shall be erected in accordance with the dimensions shown on the Drawings.

C3.3.1.1.3 PA 03 MATERIALS

C3.3.1.1.3.1 PA 03.1 POSTS, STAYS AND STANDARDS

Posts, stays and standards shall be of the type and size indicated on the Drawings. Posts shall include gate posts, straining posts, and corner posts.

Metal posts, stays and standards shall comply with the requirements of CKS 82 and SABS 280. "Acceptable" in CKS 82 means "acceptable to the Engineer".

Tubular posts, standards and stays shall be galvanized in accordance with SANS 10684 Table 1 for type B articles. All rail and Y-sections shall be provided with a protective coating of tar or other approved material.

Corner, gate, and straining posts shall be suitably drilled for stay bolts or gate fittings as indicated on the Drawings.

C3.3.1.1.3.2 PA 03.2 BOLTS FOR STAYS

Bolts shall be of mild steel and galvanized in accordance with SANS 10684 Table 1 for type C articles. The length and diameter of the bolts shall be as shown on the Drawings. All the necessary bolts, together with nuts and washers, shall be supplied with each post.

C3.3.1.1.3.3 PA 03.3 WIRE

All wire shall conform to the requirements of SABS 675 and shall be class B galvanized, except where otherwise specified below.

(a) Barbed wire

Barbed wire shall be one or both of the following types:

- (i) High-tensile grade, oval shaped, single-strand wire, 2,60 mm x 2,00 mm
- (ii) Mild-steel grade, double-strand, uni-directional twist wire, each strand 2,50 mm in diameter

Barbs shall be spaced at not more than 150 mm intervals.

(b) Smooth wire

Smooth wire shall be of the types specified below:

- (i) Straining wire shall be mild-steel wire, 4,00 mm in diameter.
- (ii) Fencing wire shall be high-tensile grade 2,24 mm diameter wire.
- (iii) Tying wire or binding wire shall be 2,50 mm diameter, mild-steel, class C galvanized wire for tying fencing wire to standards and 1,60 mm diameter, mild-steel, class C galvanized wire for tying wire mesh to fencing wire.

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(c) Barbed-tape concertinas

Barbed-tape concertinas shall comply with the requirements for type A in CKS Specification 592 and shall consist of close-coiled high-tensile wire with a continuous strip of flat steel barbs (barbed tape) crimped to the wire along the entire length of the wire. The coils shall further be attached to each other by clips to give a concertina configuration when pulled apart. The coils shall be of the diameter as shown on the Drawings. Each concertina shall have a minimum of 55 coils, and the maximum effective length of open concertina, when pulled apart, shall depend on the diameter of the roll, but shall be at least 12 m.

The high-tensile wire shall be class B galvanized and the barbed tape shall be made of cold-rolled carbon steel galvanized to class Z450. The concertina clips shall be manufactured from steel strip galvanized to class Z450.

C3.3.1.1.3.4 PA 03.4 DIAMOND MESH

Diamond mesh (chain-link fencing) shall comply with the requirements of SABS 1373. The width shall be as shown on the Drawings, and both edges shall be clinched.

The diameter of the wire shall be 2,5 mm and the mesh size shall be as shown on the Drawings and the wire shall be class B galvanized.

C3.3.1.1.3.5 PA 03.5 GATES

Gates shall comply with the requirements of CKS 146 and shall be manufactured to the dimensions shown on the Drawings.

Gates shall be complete in every respect, and shall include hinges, washers, bolts, and the locking mechanism shown on the Drawings.

C3.3.1.1.3.6 PA 03.6 CONCRETE

Concrete used for fencing shall comply with the requirements of SANS 1200 G.

C3.3.1.1.4 PA 04 CLEARING FENCE LINE

Strip clearing for the fence shall be carried out in accordance with SANS 1200 C and will be measured and paid for under Section 1200 C of the Schedule of Quantities.

C3.3.1.1.5 PA 05 INSTALLING POSTS AND STANDARDS

Straining posts shall be erected at all ends, corners, and bends in the line of fencing and at all junctions with other fences. Straining posts shall not be spaced further apart than shown on the Drawings. The height of the posts above the ground shall be such that the correct clearance between the lowest wire and the ground can be obtained.

Posts shall be accurately set in holes and, where indicated, shall be provided with concrete bases to the dimensions shown on the Drawings.

Holes shall be dug to the full specified depth. Where, due to the presence of rock, the holes cannot be excavated by hand or by pneumatic tools and the Contractor has to resort to the use of explosives, he will be paid separately for the drilling and blasting operations required.

Corner, gate, end and straining posts shall be braced by means of stays or anchors, as shown on the Drawings. Pipe stays shall be bolted to the posts. Gate posts shall not be used as straining posts, but at each gate post a straining post shall be placed as shown on the Drawings and stayed by means of an anchor consisting of six strands of wire.

Standards shall be firmly planted in the ground at the spacing shown on the Drawings or as directed by the Engineer. The spacing of standards between any two straining posts shall be uniform. In

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rock or hard material standards shall either be driven or set in holes drilled into the rock. The size of drilled holes shall be such that a tight fit is obtained. Care shall be taken not to buckle or damage the standards when driven. Where indicated, standards shall be provided with concrete bases to the dimensions shown on the Drawings.

All posts and standards shall be accurately aligned and set plumb and shall be planted with the overhang as shown on the Drawings and at right angles to the direction of the fence. After posts and standards have been firmly set in accordance with the foregoing requirements, the fencing wire shall be attached thereto as described below.

C3.3.1.1.6 PA 06 INSTALLING WIRE

All fencing wire shall be carefully stretched and hung without sag and with true alignment, and care shall be taken not to stretch the wire so tightly as to cause breaking, pulling up straining posts, or being easily damaged during veld fires.

Each strand of fencing wire shall be securely fastened in the correct position to each standard with galvanized binding wire. The binding wire for each horizontal fence wire shall pass through a hole or notch in the standard, and the ends of the wire shall be wound at least four times around the fencing wire.

At the end, corner, straining, and gate posts the fencing wire shall be securely wrapped twice around the post and secured against slipping by tying the end tightly around the wire by means of at least six snug, tight twists. In the case of high-tensile wire, two long windings must first be made before the six tight twists to prevent the wire from breaking at the first twist. Where smooth wire is used, the loose end shall be bent back and hooked into the opening between the fencing wire and the first winding.

Splices in the fencing wire will be permitted if made in the following manner with the use of a splice tool: The end of each wire at the splice shall be carried at least 75 mm past the splice tool and wrapped snugly around the other wire for not less than six complete turns, after which the two separate wire ends shall be wound in opposite directions. After the splice tool has been removed, the space left by it in the splice wire shall be closed by pulling together the wire ends. The unused ends of wire shall be cut close to leave a neat splice.

The gaps between gate posts and the adjacent straining posts shall be fenced off with short fencing wires.

C3.3.1.1.7 PA 07 INSTALLING DIAMOND MESH

Where indicated on the Drawings, diamond mesh shall be stretched against the fence and properly tied to the fencing wire. The diamond mesh shall be secured by means of binding wire at 1,2 m centres along the top and bottom wires and at 3 m centres along each of the other fencing wires, unless shown otherwise on the Drawings.

C3.3.1.1.8 PA 08 INSTALLING BARBED-TAPE CONCERTINAS

Barbed-tape concertinas shall be positioned on the fence as shown on the Drawings. The concertinas shall be fastened to the appropriate fencing wires at each standard as well as at 1,0 m maximum intervals between standards.

Rolls of barbed-tape concertinas shall be joined with binding wire at four points, spaced at equidistant intervals around the circumference of the loop. Joints shall be made to coincide with the positions of standards.

C3.3.1.1.9 PA 09 CLOSING OPENINGS UNDER FENCES

At ditches, streams, drainage channels or other hollows where the fence cannot follow the general ground contour, the Contractor shall close the opening under the fence by means of horizontal

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barbed wires 150 mm apart and stretched between additional straining posts as shown on the Drawings. The opening shall be covered with strips of diamond mesh, 1 000 mm wide, fixed to the barbed wires.

In the case of larger streams, the opening below the lower fencing wire shall be closed by means of loose-hanging wire nets as shown on the Drawings. These nets shall be erected at streams only on the instructions of the Engineer.

C3.3.1.1.10 PA 10 INSTALLING GATES

Gates shall be installed at the positions indicated on the Drawings or pointed out on Site. The gates shall be hung on gate fittings in accordance with the details shown on the Drawings. Gates shall be so erected that they swing in a horizontal plane at right angles to the gate posts and clear of the ground in all positions. Double swing gates shall close to have a gap of not more than 25 mm between them, and other gates shall close to be not more than 25 mm from the gate post.

C3.3.1.1.11 PA 11 GENERAL REQUIREMENTS AND TOLERANCES

The completed fences shall be plumb, taut, true to line and to the ground contour, and with all posts, standards and stays firmly set.

The height of the lower fencing wire above the ground at posts and standards shall not vary by more than 25 mm from that shown on the Drawings. Other fencing wires shall not vary by more than 10 mm from their prescribed relative vertical positions.

Anchoring of a fence to structures shall be done as shown on the Drawings.

The Contractor shall, on completion of each section of fence, remove all cut-offs and other loose wire or mesh so as to leave the fence with a neat and finished appearance.

C3.3.1.1.12 PA 12 MEASUREMENT AND PAYMENT

C3.3.1.1.12.1 PA 12.1 Supply and erection of new fencing material

- (a) Barbed wire (grade, size and type of wire indicated).....Unit: m
- (b) Smooth wire (grade and size indicated).....Unit: m
- (c) Barbed tape concertinas (coil diameter indicated).....Unit: m

The unit of measurement shall be the metre of each type of fencing wire and barbed-tape concertinas measured between end posts. Binding wire and wire used for the bracing and anchoring of posts shall not be measured for payment.

- (d) Diamond mesh (mesh size indicated).....Unit: m²

The unit of measurement shall be the square metre of diamond mesh and the quantity shall be calculated on the prescribed width and the length between straining posts or gate posts, or the length of strips for covering openings under fences, or the length used for the covering of gates.

- (e) Corner, end, and straining posts, including anchors (type, size and length indicated).
.....Unit: number

The unit of measurement shall be the number of posts required to conform to the maximum spacing specified or such lesser spacing as authorised by the Engineer.

- (f) Standards (length and type indicated).....Unit: number

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The unit of measurement shall be the number of standards required to conform to the maximum spacing specified or such lesser spacing as authorised by the Engineer.

(g) Droppers (length and type indicated).....Unit: number

The unit of measurement shall be the number of droppers required to conform to the maximum spacing specified or such lesser spacing as authorised by the Engineer.

The tendered rates shall include full compensation for concrete, binding wire, straining wire, bolts, washers and nuts, all excavations, drilling of holes for standards, and the complete erection of the fence as specified and as shown on the Drawings. The tendered rate for posts shall make provision for the construction of the stays of the types shown on the Drawings.

The quantity of material used shall be determined by measuring the quantities of individual items of material installed in the completed fence. No linear measure of completed fence shall be applicable.

C3.3.1.1.12.2 PA 12.2 New gates

(a) Single leaf (size and type indicated).....Unit: number

(b) Double leaf (size and type indicated).....Unit: number

The unit of measurement shall be the number of new gates erected. A pair of gates shall be measured as one.

The tendered rate shall include full compensation for gate posts, hinges, bolts, concrete, locking mechanism and straining wire, and for the erection of the gates complete as specified and as shown on the Drawings. It shall not include compensation for any fencing wire or mesh used on the gate.

C3.3.1.1.12.3 PA 12.3 Drilling and blasting holes for posts and anchors.....Unit: number

The unit of measurement shall be the number of holes for posts and anchors made by drilling and blasting where excavation by hand-tools or pneumatic tools cannot be done economically.

The tendered rate shall include full compensation for drilling and blasting the holes and for all other expenses in connection with the provision, storage, transportation and use of explosives.

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C3.3.1.3 PD BUILDING WORK

C3.3.1.3.1 PD 01 SCOPE

This is a Particular Specification and covers the various construction activities associated with the erection of buildings which form part of this Contract.

Building work shall be carried out in accordance with the National Building Regulations, SANS 10400, the applicable clauses of the SANS Standardized Specifications and the information contained in this Specification.

Work appurtenant to the erection of buildings such as earthworks, concrete work, structural steelwork, etc. shall be carried out as specified in the appropriate Standardized Specifications and will be measured and paid for under those Specifications.

C3.3.1.3.2 PD 02 BRICKWORK, PLASTER WORK AND FLOOR SCREEDS

C3.3.1.3.2.1 PD 02.1 MATERIALS

(a) Bricks

Bricks shall comply with SANS 227 and shall be of the class scheduled or shown on the drawings.

Satisfactory proof of the load-bearing capacity of the bricks offered shall be submitted before deliveries are made to the site.

Air bricks shall be well-burnt terracotta and shall be free from cracks and blemishes and lined with copper mosquito gauze.

Three samples of each type of brick shall be submitted to the Engineer for approval. All subsequent deliveries shall be of a standard equal to or better than that of the approved samples.

(b) Cement

Cement shall comply with the requirements of SANS 50197 and shall be stored under cover. The use of Portland blast-furnace cement (PBFC) which complies with the requirements of SANS 50197 will only be allowed if approved by the Engineer.

(c) Aggregate

Fine aggregate shall consist of natural sand, or crushed rock or gravel, and shall be hard, clean and free from adherent coatings or other deleterious matter. Sand for plaster and mortar shall comply with the requirements of SANS 1090, whereas the aggregates for normal and granolithic floor screeds shall comply with the requirements of BS 1199 and BS 1201 respectively.

(d) Water

Water shall be clean and free from clay, silt, oil, acid, alkali, organic or other matter which would impair the required strength and durability of the mortar, plaster, or floor screed.

(e) Wall ties

Wall ties shall be of the galvanized, crimped, single-wire type, 3,5 mm in diameter, and shall comply with the requirements of SANS 28.

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(f) Damp-proof sheeting

Damp-proof sheeting shall comply with SANS 248, type FV for fibre felt, or SANS 952, type B for embossed polyethylene sheeting.

C3.3.1.3.2.2 PD 02.2 CONSTRUCTION OF BRICKWORK

(a) Cement mortar

Cement mortar shall, unless otherwise specified, consist of one-part Portland cement to four parts sand (1:4) by volume for normal brickwork and one-part Portland cement to three parts sand (1:3) by volume for reinforced brickwork. The ingredients for cement mortar shall be measured in proper gauge boxes on a boarded platform and thoroughly mixed. Alternatively, mixing may be by means of an approved mechanical batch mixer. Only when the dry ingredients have been thoroughly mixed and a mixture of uniform colour has been obtained may the water be added in sufficient quantity to obtain mortar with the required consistency.

Cement mortar shall be used within two hours of adding water to the mix and shall not be used after two hours or if it has begun to set. Mortar shall be turned over frequently to prevent it from setting until it is used.

(b) Brickwork

Dimensions of all the brickwork shall be set out and built as shown on the drawings. Bricks shall be kept wet before laying and the top of brickwork shall be wetted before any further bricks are laid. Bricks shall be well buttered with mortar before being laid and all joints shall be thoroughly flushed up as the work proceeds. All joints to face brickwork shall be neatly made and key-drawn with a 6 mm key.

Brickwork shall be carried up in a uniform manner with no portion being raised more than 1 m above an adjacent portion. All perpend, quoins, etc., shall be kept strictly true and square and the whole properly bonded together.

Brickwork shall be built in stretcher bond or english bond as shown on the Drawings, and bats shall not be used except where required for the bond. All joints shall be 10 mm wide and four courses shall measure 340 mm.

Brickwork for cavity walls and solid walls built in stretcher bond shall be tied with wall ties placed not more than one metre apart in every third course and shall be staggered vertically. At openings, the ties shall be positioned not more than 300 mm apart along the periphery of the opening and 150 mm from the opening.

Face brickwork shall be kept perfectly clean and rubbing down of the brickwork shall not be allowed. Scaffold boards shall be turned back during heavy rain to avoid splashing. Soiled brickwork shall be cleaned at the Contractor's expense, and the cleaning method shall be approved by the Engineer.

(c) Reinforced brickwork

Brickwork over door and window openings shall be reinforced with steel rods, welded, or expanded mesh, etc. Reinforcement shall be placed in each course of brickwork for a minimum of four (4) courses or as shown on the drawings. Reinforced brickwork shall continue at least 300 mm on each side of the openings.

Brick lintels shall be built upon rigid temporary supports left in position for not less than seven (7) days after bricklaying. Prestressed concrete lintels may be used where approved by the Engineer.

(d) Key for plaster

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Joints of all brickwork receiving plaster shall be raked out, or the brick surfaces shall otherwise be prepared with an acrylic slurry or any other approved bonding agent.

(e) Damp-proofing

A damp-proof course shall be laid over the full width of all the walls at a minimum height of 150 mm above the final ground level or wherever else it may be required, and it shall be lapped for at least 150 mm at angles and joints. A damp-proof course shall also be laid and stepped up under all external sills.

(f) General

Rough and fair cutting shall be performed as required, and the brickwork shall be fitted around any steel work. Face brickwork shall be carefully cut and fitted to suit fittings.

Chases shall be left or formed for edges of concrete floors, staircases, etc. Chases shall also be provided wherever they may be required for pipes, conduits, switch boxes, distribution boards, and the like. Joints shall be raked out for flashings.

C3.3.1.3.2.3 PD 02.3 PLASTER WORK

(a) Plaster coats

A plastered finish shall consist of a single coat, comprising one application of a 1:6 cement sand mixture with a wood or steel-float finish.

(b) Thickness

The total thickness of the plaster finish shall be 13 mm minimum and 20 mm maximum.

(c) Workmanship

All plaster work shall be finished smooth and ready to receive paint. Plaster shall be flush with the faces of all switch and plug boxes, the interiors of which shall be kept free from plaster. Plastered surfaces shall be plumb, and jambs and reveals shall be formed square.

The plasterer shall cut out and make good all cracks, blisters and other defects and leave the plaster work, on completion, in a state which is acceptable to the Engineer.

C3.3.1.3.2.4 PD 02.4 FLOOR SCREEDS

Floor screeds shall have a mix proportion by mass consisting of one (1) part Portland cement and three (3) parts (1:3) fine aggregate. A minimum amount of water is to be used, but it shall be sufficient to allow adequate compaction.

Screeds shall be laid on clean hardened bases in panels not exceeding 14 m² and shall be steel-trowelled to a true and smooth finish. In monolithic construction, the panels shall not exceed 30 m². Joints in screeds shall coincide as nearly as possible with joints in the bases. The thickness of screeds shall be as shown on the drawings or as directed by the Engineer.

The entire screed surface shall be free from loose or raised particles of aggregate, trowel marks or any irregularities, humps or depressions exceeding 5 mm when measured from a 3 m long straight edge.

Screeds shall be cured for three (3) to seven (7) days as may be directed by the Engineer and shall be protected from damage.

No moisture-sensitive floor finish shall be laid on screeds unless a reliable moisture test shows that the screed is sufficiently dry to receive the covering.

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C3.3.1.3.3 PD 03 DOORS AND WINDOWS

C3.3.1.3.3.1 PD 03.1 MATERIALS

(a) General

All steel and iron work shall be delivered clean and free from rust, pitting or other defects. Shop primings shall be applied before delivery and shall consist of a coat of red oxide paint, or any other approved anti-rust paint on all surfaces.

Unless otherwise specified, all materials shall conform at least to the appropriate SANS or BS standards where such standards apply to ironmongery, or steel, cast iron and any other related materials.

(b) Pressed-steel door frames

Pressed-steel door frames shall comply with SANS 1129 and shall be manufactured from 1,6 mm thick mild-steel sheeting, pressed to the required shapes, properly mitred, welded and reinforced, with all welding neatly cleaned off.

Frames shall be of the widths required to suit the thickness of the walls into which they are built and shall be fitted with suitable tie bars and braces at the bottom. Three lugs to be built into the brickwork shall be provided on each jamb.

Rebates in frames and transoms for doors shall be of the widths required to suit the thicknesses of the doors and shall be fitted with a pair of approved steel butt hinges set flush into recesses in the frames. 4,5 mm thick reinforcing plates shall be welded to the backs of the frames at hinge positions.

Heads of frames over double doors shall be drilled where required to form keeps for bolts and shall be fitted with one rubber buffer for each leaf of the door.

Frames for single doors shall be fitted with approved chromium striking plates and an adjustable striking-plate keeper boxed in at the back of the frame by a welded-on sheet-metal box. The frames shall be fitted with a minimum of two rubber buffers.

Frames shall be protected against twisting and damage during transit and erection.

(c) Pressed-steel doors

Pressed-steel doors shall be manufactured from 1,6 mm thick steel plate. The doors shall be of standard design, pressed to shape with 40 mm reveals all round. The doors shall be strengthened with full-length vertical V-shaped or other approved sectional strengthening ribs projecting to the outer face. Two horizontal stiffening rails shall also be welded to the inner face of the doors.

A door shall be hung on a pair of 100 mm long steel butt hinges with loose pins. The leaves of the hinges shall be welded to both the door and the door frame, and a 1,6 mm thick steel plate shall be welded to the inner face of the door to protect the lock.

One leaf of double doors shall be fitted at the top and bottom with approved 150 mm cast brass barrel bolts in an approved manner and the other leaf shall be fitted with a lock, the striking plate of which shall be fixed to the first leaf.

Where indicated on the drawings, doors shall be fitted with louvred ventilation grills of approved design, backed with insect and vermin-proof gauze screening.

(d) Steel window frames

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All steel window frames shall comply with SANS 727 and shall be of the types and sizes shown on the drawings.

Standard industrial types of steel window frame shall be constructed from rolled mild-steel industrial sections, 35 mm wide by 3 mm thick, with opening sections constructed from standard residential sections, 25 mm wide by 3 mm thick, welded at angles and properly jointed at intersections.

Window frames shall be formed perfectly flat, truly square, and properly jointed at all angles, and the opening portion shall fit properly on all faces and shall open and close freely.

Glazing bars shall be continuous with jointed intersections, the ends being neatly tenoned into the frame and securely welded in position.

Frames shall be fitted with standard fixing lugs.

Opening sections shall open as indicated on the drawings and shall be fitted with steel hinges with brass pins. Pivots shall be fitted with bronze ring centres.

Side hung or top hung opening sections shall be fitted with brass handles and friction stays. Bottom hung sections shall be fitted with friction pivots and spring catches.

Weather bar drips shall be attached to the fixed frames for the complete width of the window at the head of outward opening sections.

Composite windows shall preferably be delivered to the Site fully assembled, complete with mullions and transoms.

(e) Door-locks and handles

All door-locks shall comply with the requirements of SANS 4 and shall be of approved industrial-type manufacture and pattern. All locks shall be supplied with two keys. Keys shall be distinctly numbered with consecutive numbers and each key shall be stamped with the same number as that of the lock which it controls. No two locks in any one building may have the same key.

External doors shall be fitted with four-lever heavy-duty mortice locks, which shall be master-keyed.

All locks shall be properly installed, and, after completion, striker plates shall be adjusted, and the locks serviced.

Doorhandles shall be of cast zinc of approved manufacture and pattern.

(f) Miscellaneous fittings

All retaining devices for doors and windows as well as fittings such as coat hooks, retaining hooks, etc. shall be of solid brass. All fittings shall be secured by screws or set screws of the same material and finish as the fitting.

Fittings to be fixed to plastered walls, masonry or floors shall be fixed direct by means of patent plastic or fibre plugs fitted into drilled holes.

Doorstops shall be provided at every door and shall be 40 mm diameter rubber stops.

(g) Aluminium windows and doors

Aluminium extrusions shall be of 6063-T6 alloy and temper. Aluminium sheet and strips shall be of 1200-H4 alloy and temper.

Joints in all aluminium members shall be formed in an approved manner so that the joints are practically invisible. Screw heads, pins, rivets, etc shall be concealed as far as possible. 300 Series stainless steel screws and bolts shall be used for jointing and fixing aluminium work.

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The surfaces of all aluminium which are in contact with other materials when fixed shall be suitably insulated with a non-absorbent insulating material to prevent corrosion. All aluminium work shall be suitably protected against damage, deterioration or discolouration caused by mortar droppings, paint, etc by taping with removable tape, covering with temporary casings or by covering with motor oil.

Aluminium described as “anodized” shall be treated with Grade 25 coating thickness for exterior use or Grade 15 for interior use as specified, to the required finish. All alloys to be anodized shall be suited to anodizing.

These specifications shall apply to aluminium windows, doors, etc in all respects in so far as they are applicable. Aluminium windows and doors shall be manufactured from extruded aluminium members of 6063T6, 6261-T6 or 6082-T6 alloy and temper.

Ancillary members such as sills, flashings, infill panels and the like formed from flat sheet material shall be of an appropriate alloy selected from 1200, 3004 or 5251 complying with BS 1470 of a temper suitable for the method of forming and a composition suitable for anodizing or painting as required.

Windows, doors, etc shall be of an approved standard system, manufactured by an approved firm experienced in this type of work, and shall meet with the minimum recommended performance requirements as set out by the Association of Architectural Aluminium Manufacturers of South Africa (AAAMSA) in the latest edition of the Selection Guide.

The fittings for all opening sashes shall be substantial and, unless otherwise described, shall be of high quality aluminium alloy finished to match the windows, doors, etc on which they occur. Samples of all fittings shall be supplied to the Principal Agent for approval.

Top, side and bottom hung opening sashes shall be hung on two aluminium hinges with 300 Series stainless steel pins, nylon bushes and stainless-steel washers. Side hung sashes shall have fasteners and sliding stays, top hung sashes shall have peg stays and bottom hung sashes shall have spring catches and concealed arms.

Projected out sashes shall have aluminium fasteners and concealed arms of a non-corrosive material compatible with aluminium.

The frames which are to be built into openings in brickwork shall be fitted with the manufacturer’s standard type fixing lugs, not less than 20 x 3 x 150mm long, screwed to frame and placed one near each corner and intermediately not more than 450mm apart to sides, top and bottom and where fixed to concrete reveals, wood sub-frames or to preformed openings in brickwork shall have countersunk holes for screws, one near each corner and intermediately not more than 450mm apart to sides, top and bottom.

Where so described, openings and sashes of windows and doors shall be fitted with approved channel section aluminium glazing beads sufficient in size and profile to suit the method of glazing employed, finished to match the windows, doors, etc and neatly mitred. Screws where necessary shall be of aluminium or 300 Series stainless steel and have pan or raised heads finished to match the beads.

Windows, doors, etc described as “anodized” shall be treated with Grade 25 coating thickness. Windows, doors, etc described as “factory painted” shall have an electrostatically applied oven baked polyester paint coating not less than 25 micrometres thick.

Aluminium windows, doors, etc shall include glass as described, fixing in position, sealing and protection against damage, deterioration or discolouration by taping with removable tape or covering with temporary casings or motor oil and removing same on completion.

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C3.3.1.3.3.2 PD 03.2 INSTALLATION OF DOORS AND WINDOWS

All built-in door and window frames shall be set straight, plumb, and level, and shall operate to the satisfaction of the Engineer after fixing has been completed.

Fittings shall be either removed, or wrapped and protected from damage, until all rough trades have been completed.

C3.3.1.3.4 PD 04 GLAZING

C3.3.1.3.4.1 PD 04.1 MATERIALS

(a) Glass

Glass shall comply with the requirements of CKS 55. The quality of all window glass shall be such that surface deterioration will not develop after glazing.

All glass shall be free from bubbles, waviness, scratches, stains, or other imperfections.

Unless otherwise specified, sheet glass for glazing shall be flat-drawn clear glass of ordinary glazing quality and of the thicknesses indicated below:

For panes not exceeding 0,75 m² in area 3 mm

For panes exceeding 0,75 m² but not exceeding 1,5 m² in area 4 mm

(b) Putty

All putty shall comply with the requirements of SANS 680.

Putty shall not be too hard or soft or caked when used and shall dry evenly without crazing or cracking.

Defective putty shall be cut out and replaced by the Contractor at his own expense, and any broken glass shall also be so replaced and putty so repainted.

C3.3.1.3.4.2 PD 04.2 GLAZING

Glass shall be cut in panes to suit all glazed openings with sufficient clearance all round to prevent cracking by expansion, contraction, or vibration.

In all cases the glass shall be well bedded and back-puttied and installed as specified in SANS Code of Practice 10137.

All putty shall be carefully trimmed, cleaned off and neatly finished off straight with smooth surfaces and sharp mitres. A paint primer shall be applied as soon as the putty has dried out sufficiently to prevent shrinkage cracks from forming.

The entire glazing operation shall be cleaned before the premises are handed over for occupation.

C3.3.1.3.5 PD 05 CARPENTRY AND JOINERY

C3.3.1.3.5.1 PD 05.1 GENERAL

(a) Materials

All timber used for structural purposes shall be of merchantable grade and shall comply with the requirements of SANS 1783-1 and SANS 1783-2. Structural timber shall be carefully selected and of the best quality, free from large or dead knots, shakes, waney edges or other defects. Purlins

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and brandering shall comply with the requirements of SABS 1783-4. Finger-jointed structural timber shall comply with the requirements of SANS 10096 and laminated timber with the requirements of SABS 1460.

Hardwoods and softwoods for joinery shall comply with SANS 1099 and SANS 1783-3 respectively and suitable species shall be used for the various purposes.

Unless otherwise specified, all materials shall conform to the appropriate SANS or BS Specification where such standards exist for nails, screws, bolts, adhesives, etc.

(b) Preservative treatment

All structural timber shall be given a preservative treatment suitable for the duty for which the timber is intended in accordance with SANS 10005, and no untreated timber shall be used. The preservative treatment shall not impair the final finish. The timber shall be impregnated throughout. When surface coating is specified, the compounds applied on the surfaces of the timber shall form an unbroken film.

(c) Priming

The jointing surfaces of all joints exposed to the weather and built-in portions of frames shall be thickly primed except where adhesives are specified.

Carpentry and joinery items which are prepared for painting by the manufacturer, shall be knotted and primed before being dispatched to the Site.

Primed surfaces shall be touched up where necessary during the progress of the work or where site adjustments have been made.

C3.3.1.3.5.2 PD 05.2 CARPENTRY WORK

(a) Scope of work

Carpentry work shall be carried out in a manner consistent with good workmanship and in compliance with the drawings.

The carpenter shall perform all cutting away and making good in attendance upon all other trades and he shall provide and maintain temporary coverings required for the protection of any finished work that might be damaged if left unprotected during the progress of the work.

(b) Dimensions

Unwrought timber shall be as sawn and shall be to the dimensions and within the tolerances specified in the relevant SANS Standard Specifications mentioned in subclause PD 05.1(a).

(c) Jointing

Unless otherwise specified, all joints shall be secured by means of a suitable type and a sufficient number of approved connectors. All joints shall be carefully made in such a way that they will not impair the strength and stiffness of the beams or members.

(d) Timber roof construction

The plates, joists, rafters, purlins, brandering and other pieces used for the construction of the roof and trusses shall be of the dimensions, spacing and construction as shown on the drawings.

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All the joints in the framework shall be of the most appropriate type, accurately formed and adequately secured with fasteners as specified.

C3.3.1.3.5.3 PD 05.3 JOINERY WORK

(a) Scope of work

Joinery work shall consist of the manufacture, delivery to the site, and fixing in the buildings, of all joinery shown on the drawings.

Except where a special finish is specified, the Contractor shall have all stairs, landings, doors, shelves, and other joinery work cleaned and scrubbed down and shall leave all his work in a good order to the satisfaction of the Engineer.

(b) Dimensions

All wrought timber shall be sawn, planed, drilled, or otherwise machined or worked to the correct sizes and shapes shown on the drawings.

Reasonable tolerances shall be provided at all connections between joinery works and the building structure to compensate adequately for any irregularities, settlements, or any other movements.

(c) Manufacture

The joiner shall perform all the necessary mortising, tenoning, grooving, matching, tonguing, housing, rebating and all the other works necessary for correct jointing. He shall also provide all metal plates, screws, nails, and other fixings that may be necessary for doing the specified joinery work properly.

(d) Joints

Where joints are not specifically indicated, they shall be the recognised forms of joints for each position. The joints shall be so made as to comply with Part 2 of BS 1186.

(e) Doors and frames

Door frames, linings, panel doors, framed, ledged and braced doors, flush doors, sliding doors, etc. shall be supplied or made by the joiner and shall be installed, fitted, or hung as detailed on the drawings.

All timber shall be wrought and prepared for oiling, staining, varnishing, or painting.

(f) Skirtings, cornices, etc.

Skirtings, cornices, etc. shall not be installed until after the wall coverings have been applied, the flooring laid and ceilings installed, unless otherwise specified.

(g) In-situ joinery

In-situ joinery work shall not be executed until after all floor, wall and ceiling surfaces have been formed or constructed, unless otherwise instructed.

(h) Ceilings

Ceilings shall consist of plaster board or fibre-cement panels as shown on the drawings and shall be nailed to the brander or suspended from the roof structure. The panels shall be separated by exposed tees and insulated with a 50 mm thick fibreglass wool blanket where shown on the drawings.

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C3.3.1.3.6 PD 06 ROOF SHEETING AND ACCESSORIES

Roof sheeting and accessories shall comply with and will be measured and paid for under SANS 1200 HC.

C3.3.1.3.7 PD 07 ELECTRICAL WORK

The electrical wiring of buildings shall be carried out by registered and licensed electricians in accordance with the requirements of SANS 10142-1 and the regulations of the Employer.

The electrician shall work in close co-operation with the Contractor to ensure that all conduits, switchboards, plug boxes and switch boxes are installed in their correct position.

The work shall be carried out in accordance with the drawings and to the satisfaction of the Engineer and the local authority.

C3.3.1.3.8 PD 08 PLUMBING

C3.3.1.3.8.1 PD 08.1 MATERIALS

(a) General

All materials shall be of the best quality and shall be approved by the Engineer before installation. Cracked, chipped, dented, or faulty items or materials shall be replaced at the Contractor's expense. Glazed ceramic sanitary ware shall comply with the requirements of SANS 497 and all other materials shall comply with the standards as specified, scheduled, or shown on the Drawings.

(b) Water closet (WC) suites

WC suites shall consist of a white glazed vitreous china closet with an S or P trap and seat lugs, a 14 litre low-level matching flat-bottomed flushing cistern placed and fixed on the closet, or a suspended enameled cast-iron cistern with the flush pipe connected to the flushing rim of the closet with rubber cone joints, and a solid heavy-duty plastic seat with cover, hinges and buffers.

(c) Urinals

Urinals shall be of the type detailed or scheduled, of white glazed vitreous china, wall mounted, with an automatic or a manual flushing system, and chromium-plated fittings.

(d) Wash-hand-basins

Wash-hand-basins shall be of white glazed vitreous china or enameled cast iron, wall mounted on a pair of cast-iron brackets, and fitted with chromium-plated fittings consisting of two taps, outlet and chain, and supplied with a plug and an anti-siphon trap.

(e) Sinks

Sinks shall comply with the requirements of SANS 242 and shall be complete with cabinet, chromium-plated outlet, anti-siphon trap, plug, chain and two bib taps or one mixer tap, all as detailed or as scheduled.

(f) Pipes and tubing

Cast-iron and steel pipes used in plumbing work shall comply with the requirements of SANS 746 and SANS 62 respectively. Copper tubing shall comply with the requirements of SANS 460 and malleable cast-iron fittings with SANS 14.

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C3.3.1.3.8.2 PD 08.2 CONSTRUCTION

Plumbing shall be carried out strictly in accordance with the Drawings and with the National Building Regulations, with specific reference to Government Notice R1875 dated 31 August 1979.

Steel pipes and their malleable cast-iron fittings shall be joined with red lead and hemp, lead pipes shall have wiped soldered joints, and cast-iron pipes shall be joined by caulking with hemp and metallic lead.

Soil pipes from WCs shall have an internal diameter of at least 100 mm and shall be fitted with a pan connector and an access bend (or an access junction where a vent pipe is used), and carried through walls and into the ground for connection to the sewer. Vent pipes shall be fitted with approved balloon gratings.

Waste pipes from basins and sinks shall have an internal diameter of at least 32 mm and shall discharge into gulleys. Bends for waste pipes shall incorporate cleaning eyes.

Cisterns, basins and sinks shall be connected to the pipe system with 12 mm diameter copper service pipes, and chromium-plated stopcocks shall be installed for isolation and maintenance purposes.

C3.3.1.3.9 PD 09 PAINTING

C3.3.1.3.9.1 PD 09.1 GENERAL

No paint shall be applied to any surface containing traces of dust, grit, grease, oil, loose rust, mill scale or corrosion products of any kind or to any surface that is not free from moisture. Where necessary, surfaces shall be thoroughly washed to remove all traces of soluble salts and/or corrosive air-borne contaminants prior to painting, and the surfaces shall be dried and painted immediately thereafter.

Welding shall be completed in so far as it is possible before painting commences, but in cases where welding can be done only at a later stage, no paint shall be applied to within 75 mm of the proposed weld position unless otherwise specified. Welds and adjacent parent metal shall be abrasive blasted and/or ground and all contaminants such as flux shall be removed prior to painting.

Surfaces of members which are to rest on concrete or other floors or which will be otherwise inaccessible after erection shall receive the full paint system prior to erection.

Damaged paint areas on metal surfaces shall be cleaned, rust spots removed where applicable and the surrounding paint which is still intact shall be feathered for a distance of 20 mm beyond the damaged area. Spot priming and repair shall consist of all the coats previously applied and shall overlap the damaged area.

Damaged galvanised areas shall be cleaned and any rust spots and any flakes of the coating surrounding the damaged area removed. The coating shall then be restored by zinc spraying or soldering, or painting with a zinc-rich paint, as may be approved by the Engineer.

Where the shop coat is allowed to age for a few months before the final painting is done, light sanding or rubbing with steel wool or scrubbing with clean water using a bristle brush shall be carried out.

Steel to be embedded in concrete shall not be painted below 50 mm from the final level of the concrete.

Each priming coat and each undercoat of paint shall be inspected and approved by the Engineer before any subsequent undercoat or finishing coat is applied.

All finishing colours shall be as shown on the drawings, or as directed by the Engineer.

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C3.3.1.3.9.2 PD 09.2 MATERIALS

Paints shall comply with the requirements of the appropriate specifications below:

- Painting of Structural Steel - EN ISO 12944
- Painting of Buildings - BS 6150
- Undercoats and Finishing Coats - BS 7664

The Contractor shall furnish the Engineer with the following information and details regarding the paints and decorative materials for the painting system he proposes to use, for written approval:

- (i) The name of the manufacturer and trade name
- (ii) The brand, type or grade of paint and the appropriate Specification
- (iii) Manufacturer's data sheets, colour references, instructions for use, including surface preparation, sealers, primers, undercoats, finishing coats, coat thicknesses and curing periods, which shall all be considered as being part of these Specifications if approved by the Engineer
- (iv) Safeguards to protect the applied paint from damage until the work is accepted by the Engineer
- (v) The shelf or pot life of materials, if applicable
- (vi) An undertaking that the proposed paint system is suitable for its intended use and that the various coats of paint are compatible with one another

Where proprietary brands are used, the manufacturer's priming and all subsequent coats of paint suitable for that particular brand shall be employed in accordance with the manufacturer's instructions.

No other materials of a similar nature and quality or from another manufacturer may be used instead of those approved, unless written permission to do so has been obtained from the Engineer.

All materials shall be brought onto the site in containers sealed by the manufacturer. Paints of a different quality, type, brand or colour shall not be mixed, or thinned and shall not be adulterated in any way, but shall be used as supplied by the manufacturer. Any mixing or tinting required shall be carried out by the manufacturer.

Tinting of paint on the site by the Contractor will only be allowed with the written permission of the manufacturer and the Engineer.

C3.3.1.3.9.3 PD 09.3 INSPECTION AND PRELIMINARY WORK

Before commencing paintwork, the Contractor shall carefully inspect the surfaces to be painted to satisfy himself that the surfaces are in a satisfactory or acceptable condition to receive the paint system specified.

All metal fittings and fastenings shall be removed where applicable before the preparatory processes are commenced. On completion, the metal fittings and fastenings shall be cleaned and refitted in position.

C3.3.1.3.9.4 PD 09.4 WORKMANSHIP AND FINISHES

Paint may be applied by spray, brush or roller depending on the materials used, the surface to be painted, and the manufacturer's instructions.

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Every coat of paint, irrespective of the method of application, shall be adequately and permanently keyed or bonded to the base material or previously applied coat, and shall be evenly distributed, continuous, free from sags, runs, brush marks, pin holes or other imperfections, and shall dry to a smooth finish.

An approved water trap and air-regulating valve shall be furnished and installed on all equipment used in spray painting.

Before painting the interiors of buildings they shall be cleaned and the floors shall be washed and kept free from dust during the progress of the interior work.

The Contractor shall protect all nearby surfaces against disfigurement by spatters, splashes and smirches of paint or paint materials. The Contractor shall be responsible for any damage by paint or dirt caused by his operations to vehicles or property or injury to persons and he will be required to provide protective measures to prevent any such damage or injury and make good, where required, at his own expense.

If passing traffic creates dust which may harm or spoil the appearance of external painted surfaces, the Contractor shall sprinkle the adjacent areas with water, at his own cost, for a sufficient distance on each side of the location where painting is being done.

Undercoats shall be tinted by the manufacturer to distinguish between successive coats.

The final coats or finishing coats of paint shall be applied after all the other work in the vicinity has been completed.

The painter shall keep some of the final paint in reserve in the event of his having to make good any patching which may be required as a result of damage or unforeseen circumstances.

Upon completion, the Contractor shall, in the case of buildings, clean all glass, remove all paint spots from walls, floors and fittings, and leave the premises clean and fit for occupation.

All inflammable materials, comprising solvents, thinners, wiping cloths, etc., shall be placed in tightly closed containers and properly disposed of.

C3.3.1.3.9.5 PD 09.5 PAINTING OF PLASTER, CONCRETE OR BRICK SURFACES

(a) Surface preparation

Surfaces for painting shall be prepared by sandpapering, scraping or wire-brushing to remove loose material, dust, laitance, scum or other deleterious materials or high spots. Defective areas shall be cut out where necessary and made good with an approved non-shrink filler. Cracks shall be cut out, suitably keyed, and given a coat of an approved bonding agent before the filler is applied. All patches shall be rubbed down to an even surface. Surfaces shall be washed and allowed to dry.

Surfaces shall be treated with neutralising liquid for walls, and if the surface is coarse or textured, either one full coat of pigmented wall sealer or one full filler coat shall be applied in addition to the neutralising liquid.

(b) Paint application

Prior to the emulsion paint being applied, the surface shall be sealed with an approved clear sealer and primed with an undercoat diluted to 50%. Emulsion paint (PVA or acrylic) shall then be applied in two finishing coats.

Egg-shell finish (alkyd oil-based), oil gloss paint or enamel gloss paint shall be applied as follows: one coat of universal undercoat shall be applied and it shall be followed by one coat of a mixture

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comprising 50% of the undercoat and 50% of the paint to be used for the finishing coat. A finishing coat of semi-gloss egg-shell, or oil gloss paint or enamel gloss paint shall then be applied.

C3.3.1.3.9.6 PD 09.6 PAINTING OF WOODWORK

(a) Surface preparation

The surfaces shall be cleaned, sandpapered and rubbed down to a smooth, even face before painting. The moisture content of the timber shall not be more than 20% at the time when the first coat is applied. All cracks, shakes or scars shall be filled flush with a filler approved by the Engineer before painting. The surface shall then be washed with cleaner and allowed to dry.

(b) Primer application

One coat of an approved wood primer shall be applied.

After open-grained timber has been prepared and primed, the grain shall be stopped and filled with synthetic filler and rubbed down with water paper.

All new woodwork shall be properly primed on all surfaces and edges before being fixed in position. All woodwork not previously painted shall be given a prime coat, well brushed in.

(c) Paint application

One coat of universal undercoat shall be applied followed by one coat of a mixture of 50% of the undercoat and 50% of the paint to be used for the finishing coat. A finishing coat of oil gloss paint or enamel gloss paint or semi-gloss egg-shell (alkyd oil-based) paint shall then be applied.

(d) Varnish finish

Two coats of gloss varnish or egg-shell varnish shall be prepared, stopped and applied.

C3.3.1.3.9.7 PD 09.7 PAINTING OF METAL SURFACES

(a) General

Wherever possible, all painting shall be done at the manufacturer's works, but where this is not feasible, the Engineer may permit the application of the undercoat and finishing coats to be carried out on the Site, in which case a prime coat shall be applied at the manufacturer's works prior to the members being dispatched to the Works.

(b) Surface preparation

The preparation of metal surfaces shall comply with SANS Code of Practice 10064 and shall receive the greatest care to ensure rust-free conditions prior to the paint system being applied.

All surfaces shall be prepared by removing loose paint, rust, plaster, scale, dust, dirt, grease, etc. and by repairing or patching defective paint surfaces before painting or repainting. Damaged shop-primed surfaces shall be thoroughly cleaned of rust and patched with a prime coat.

(c) Paint application

(i) Iron and steel work

All iron and steel work shall be properly primed with a red-lead-based primer where steel work is likely to be exposed to the elements for longer than 30 days. Zinc-chromate primer may be used where overpainting will be completed within 30 days of priming. Metal-etch wash primers may be

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used under dry conditions where overpainting will be completed within 24 hours of priming. The dry-film thickness of the prime coat shall not be less than 0,300 mm.

After priming, one coat of universal undercoat shall be applied. If necessary, the undercoat shall be tinted to a shade just lighter than the desired finish with approved liquid stainers. The dry-film thickness shall not be less than 0,250 mm.

The two finishing coats shall either be of alkyd resin-based synthetic enamel, gloss or matt oil paint, or as specified elsewhere. The dry-film thickness shall not be less than 0,250 mm per coat.

When mating surfaces are brought together, both surfaces shall have been given the full treatment specified, but where this cannot be done, each surface shall be given a copious coating of primer and the surfaces drawn together while the paint is still wet.

The portion of structural steel members to be buried in soil, and all bases to a height of 500 mm shall be given two coats of an epoxy-tar primer instead of the zinc-chromate primer specified for other surfaces.

The surfaces of steel and cast-iron articles, such as floor gratings, grids and manhole covers, shall, after a thorough brushing to remove loose rust, be painted with two coats of epoxy-tar paint, each at least 0,230 mm thick.

(ii) Galvanized iron and steel

All traces of protective coating shall be removed with galvanized iron cleaner, and two coats of calcium plumbate primer shall be applied. One coat of tinted universal undercoat and two finishing coats of alkyd resin-based synthetic enamel gloss paint shall be applied.

(iii) Non-ferrous metals

Surfaces of aluminium, copper, etc. shall be prepared and cleaned, and one coat of self-etch zinc-chromate wash primer shall be applied. One coat of universal tinted undercoat and two finishing coats of enamel gloss paint shall then be applied. Where non-ferrous metals are not to be painted, the surfaces shall be cleaned, polished and two coats of lacquer applied.

C3.3.1.3.9.8 PD 09.8 PAINTING OF FLOOR SCREEDS

Where chemicals could cause damage to floors, such floors shall be painted with an approved epoxy paint. The type of paint to be used will be shown on the drawings and will depend on the types of chemical that are used.

The preparation of such floor screeds for painting and the subsequent application of paints shall be carried out strictly in accordance with the manufacturer's instructions.

C3.3.1.3.9.9 PD 09.9 PAINT THICKNESS

Unless otherwise specified, all coats of paint, whether prime coat, undercoat or finishing coat, shall have a dry-film thickness of not less than 0,200 mm, irrespective of the method of application.

C3.3.1.3.9.10 PD 09.10 INSPECTION

The Contractor shall provide the necessary equipment to establish whether the primers, undercoats and finishing coats have been applied to the correct thickness according to the correct applications. The Engineer may take samples of the paints during painting operations for testing and quality control.

C3.3.1.3.10 PD 10 MEASUREMENT AND PAYMENT

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C3.3.1.3.10.1 PD 10.01 Brickwork:

- (a) (Thickness, type, and class indicated) Unit: m²
- (b) Etc. for other thicknesses, types and classes

The unit of measurement shall be the square metre of each type of brickwork built, calculated from the leading dimensions of the brickwork. Areas of pipes, etc. built into brickwork shall not be included in the areas measured. At corners and intersections common to more than one brick wall, the areas shall be measured only once.

The tendered rates shall include full compensation for the construction of the brickwork complete as specified, including pointing, the building-in of conduits, beams, lintels, pipe sleeves, doors, windows, the raking-out of joints, damp-proof course, brickforce reinforced as specified, etc.

C3.3.1.3.10.2 PD 10.02 Plaster work:

- (a) (Thickness of plaster and finish indicated)Unit: m²
- (b) Etc. for other thicknesses and finishes

The unit of measurement shall be the square metre of each type of coat completed as specified.

The tendered rates shall include full compensation for the construction of the plaster work, including supplying all materials, mixing, applying, finishing, forming reveals, joints, narrow widths, rounded angles, V-joints, etc. complete as specified.

C3.3.1.3.10.3 PD 10.03 Floor screeds:

- (a) (Description and thickness indicated)Unit: m²
- (b) Etc. for other thicknesses

The unit of measurement shall be the square metre of floor screed laid, as specified, on floors, steps or areas shown on the drawings or as designated by the Engineer.

The tendered rates shall include full compensation for constructing the floor screeds, including supplying all materials, mixing, laying, finishing, and forming nosings, reedings, skirtings, etc.

C3.3.1.3.10.4 PD 10.04 Doors and windows:

- (a) (Type and size indicated)Unit: number
- (b) Etc. for other types and sizes

The unit of measurement shall be the number of doors and windows installed complete as specified.

The tendered rates shall include full compensation for manufacturing and installing steel doors, powder-coated aluminium windows, and frames complete with hinges, handles, industrial-type locks, barrel bolts, retaining devices, door stops, stays and any other work necessary to complete the work as specified or as shown on the drawings. The tendered rate for windows shall also include full compensation for glazing, window sills as specified, and damp-proof sheeting.

C3.3.1.3.10.5 PD 10.05 Structural timber:

- (a) Plates (sizes indicated)Unit: m

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- (b) Beams (sizes indicated)Unit: m
- (c) Joists (sizes indicated).....Unit: m
- (d) Rafters (sizes indicated)Unit: m
- (e) Purlins (sizes indicated)Unit: m
- (f) Roof trusses complete (drawing number indicated)Unit: number
- (g) Roof truss system complete (drawing number indicated)Unit: Sum

The unit of measurement shall be the metre of individual types of timber element or the number of complete trusses installed.

The tendered rates shall include full compensation for supplying all materials and manufacturing, cutting, wasting, jointing and installing the timber as shown on the drawings.

C3.3.1.3.10.6 PD 10.06 Ceilings:

- (a) Plaster-board ceiling (type and thickness indicated):
 - (i) Fixed ceiling.....Unit: m²
 - (ii) Suspended ceiling.....Unit: m²
- (b) Fibre-cement ceiling (thickness indicated):
 - (i) Fixed ceiling.....Unit: m²
 - (ii) Suspended ceiling.....Unit: m²

The unit of measurement shall be the square metre of fixed or suspended ceiling installed complete as scheduled.

The tendered rates shall also include full compensation for the construction of the ceilings, including the exposed tees, insulation blanket and brandering as specified, as well as the suspension system where applicable.

C3.3.1.3.10.7 PD 10.07 Joinery:

- (a) Items measured by number:
 - (i) Doors (type and size indicated).....Unit: number
 - (ii) Etc. for other items measured by number
- (b) Items measured by length:
 - (i) Skirtings (type and size indicated).....Unit: m
 - (ii) Etc. for other items measured by length

The units of measurement shall be the metre of each type and/or size of joinery item specified.

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The tendered rates shall include full compensation for supplying all materials, and manufacturing, cutting, wasting, fixing and installing the joinery items.

C3.3.1.3.10.8 PD 10.08 Miscellaneous work:

- (a) Paintwork.....Unit: sum
- (b) Plumbing.....Unit: sum
- (c) Electrical work.....Unit: sum

The tendered sums shall include full compensation for the supply of all materials, for transport, storage, all equipment and labour, all temporary work and safety precautions, replacement of defective work, protection of completed work and clean-up after completion.

C3.3.1.3.10.9 PD 10.09 Miscellaneous items:

- (a) Items measured by number:
 - (i) (Description of item).....Unit: number
 - (ii) Etc.
- (b) Items measured by length:
 - (i) (Description of item).....Unit: metre (m)
 - (ii) Etc.
- (c) Items measured by area:
 - (i) (Description of item).....Unit: square metre (m²)
 - (ii) Etc.

The unit of measurement shall be the number, linear metro and square metre as applicable to each item.

The tendered rates shall include full compensation for all labour, plant, equipment, transport, etc., manufacturing or providing and installing each item complete as scheduled and shown on the drawings, and shall include all corrosion protection where applicable.

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RENOVATIONS AT NORTHERN WORKS LABORATORY
AND FLOW LABORATORY
Particular Specifications



ELECTRICAL

- E100 STANDARD ELECTRICAL LOW VOLTAGE SPECIFICATION**
- E100.1 GENERAL DESIGN
 - E100.2 TESTING AND COMMISSIONING
 - E100.3 LOW VOLTAGE CABLES
 - E100.4 LOW VOLTAGE SWITCHGEAR AND CONTROL GEAR ASSEMBLIES
 - E100.5 CABLE SUPPORT SYSTEMS
 - E100.6 WIRING AND OUTLETS
 - E100.7 LIGHTING
 - E100.8 STREET AND AREA LIGHTING

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E200 STANDARD ELECTRICAL LOW VOLTAGE SPECIFICATION

C3.3.4.2.1 E100.1 GENERAL DESIGN

C3.3.4.2.1.1 E100.1.1 SCOPE

This standard specification covers general design criteria and standards applicable to all sections of work. Should the requirements of this standard specification conflict with any other standard specification or the detail specification, the other standard specification or detail specification shall govern, and the Tenderer/Contractor shall seek information of such precedence from the Engineer. All items covered in this specification may not necessarily be applicable to this project.

C3.3.4.2.1.2 E100.1.2 DESIGN

- a) The works shall be designed to facilitate easy accessibility, equipment replacement, maintenance, handling, inspection cleaning and repairs and to ensure satisfactory operation in which safety of plant, personnel and public and continuity of service is the first consideration.
- b) All plant, equipment and apparatus shall operate satisfactory under the ambient and other conditions prevailing at the site.
- c) All apparatus shall be designed to prevent the risk of accidental short circuits due to animals, birds, ants and vermin.
- d) All moving, rubbing or wearing surfaces shall be machined or ground where they bear upon each other.
- e) The plant and equipment shall be designed and constructed to keep maintenance costs and the number of persons employed for maintenance to a minimum.
- f) All the equipment shall be to the approval of the Engineer and shall, unless otherwise specified, be suitably designed for operation on normal electrical supply systems, with voltage fluctuations of plus and minus 10% and under such sudden variations of load and voltage as may be met with under working conditions.
- g) The design of equipment shall include as a major consideration the absolute safety of the general public, operating and maintenance personnel.
- h) All dimensions, units and design parameters shall be in accordance with the international metric (SI) system.

C3.3.4.2.1.3 E100.1.3 STANDARDS

- a) All electrical equipment shall be of approved manufacture and its construction, design and testing shall be in accordance with the requirements of the most recent South African, British Standards or IEC publications including all amendments issued thereto up to the date of tender. The installation and equipment shall also comply with the relevant clauses of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993), and the regulations promulgated in terms of the Act, and with the Code of Practice for The Wiring of Premises, SANS 10142-1.
- b) Notwithstanding reference in this specification to South African or British Standards and IEC or ISO recommendations the supplier may submit for approval material and designs conforming to other technically equivalent national standards, provided that the supplier supplies the Engineer with a translation of the standards into English and satisfactory proof of actual compliance therewith.

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C3.3.4.2.1.4 E100.1.4 QUALITY OF MATERIAL

All material shall be new and of a design and class suitable for working under the conditions specified, and shall withstand the variations of temperature and atmospheric conditions arising under working conditions without distortion, deterioration, or the setting up of undue stresses in any part such as to affect the efficiency and reliability of the plant and also without affecting the strength and suitability of the various parts for the duty which they have to perform.

C3.3.4.2.1.5 E100.1.5 INTERCHANGEABILITY

Corresponding parts throughout the works shall be made to such close tolerances that all similar components and spares shall be fully interchangeable without any further alterations or adjustments being necessary.

C3.3.4.2.1.6 E100.1.6 BOLTS AND NUTS

- a) The threads of all bolts, nuts and studs shall be in accordance with SABS 135.
- b) No brass bolt or stud shall have a diameter of less than 6 mm.
- c) All nuts and studs shall be locked in position by lock washers and where necessary, lock nuts.
- d) Each bolt shall protrude by at least one but not more than five threads through the nut with all washers in position.
- e) All bolts, nuts and washers used outdoors shall be of approved materials and treated to prevent corrosion of the threads.
- f) The Contractor shall provide special tools if any bolt, nut, screw or other fastener is used in a position, which is not accessible using conventional tools. This also applies where the size or shape of the fastener is not conventional.

C3.3.4.2.1.7 E100.1.7 FIRE PRECAUTIONS

All apparatus, connections and cabling shall be designed and arranged to minimize the risk of fire and any damage, which might be caused in the event of fire.

C3.3.4.2.1.8 E100.1.8 GALVANISING

- a) Where galvanizing is specified, or is a requirement of the design, such galvanizing shall be performed by the hot-dip process to SANS 121:2000.
- b) For all parts, other than wires, the equivalent zinc coating thickness shall not be less than 455 g of zinc per square metre of surface area.
- c) The galvanising must be clean, smooth, of uniform thickness, unblemished and free from defects.
- d) The preparation for galvanising and the galvanising itself shall not adversely affect the mechanical properties of the coated material.
- e) All drilling, welding, cutting, sawing, punching, filing and bending shall be complete and the metal shall be cleaned of any machining blemishes, mill scale, rust and lubricants, before galvanising.
- f) Galvanised areas must be kept free of lubricants. Surfaces which are in contact with oil shall not be galvanised or cadmium plated.
- g) Electrolytic deposition of zinc is not acceptable.

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- h) Where it is not practicable to coat the surface of metal by the hot-dip galvanising process, such equipment may be zinc-sprayed instead. The surface being zinc-sprayed shall be suitably prepared in accordance with the requirements of the process adopted and the rate of deposition of zinc shall not be less than 760 g per square metre of surface area. After zinc spraying the surface shall be painted with a suitable paint to render it completely impervious.

C3.3.4.2.1.9 E100.1.9 WELDING

- a) All welding shall comply with the appropriate international standards such as BS 1856 (General specification) and BS 709 (methods of testing).
- b) The welding shall be executed in accordance with modern accepted practice for welding and shall be sound, full strength and free from undercut and slag inclusions. Crater effects at the ends of weld runs shall be eliminated.
- c) Intermittent welding and incomplete penetration butt-welding will not be accepted.
- d) All fabricated items shall be stress relieved after welding.
- e) The supplier shall well in advance of the commencement of fabrication, submit for approval details of proposed welding procedures.

C3.3.4.2.1.10 E100.1.10 ELECTROMAGNETIC INTERFERENCE

- a) All equipment installed under this contract shall comply with the requirements of IEC 61000 Parts 1 to 6 Electromagnetic Compatibility (EMC).
- b) Any equipment found producing Electromagnetic interference subsequent to commissioning, shall be suppressed or replaced to the satisfaction of the Engineer without any cost to the Employer.

C3.3.4.2.1.11 E100.1.11 LABELS AND NOTICES

- a) Identification labels must be attached to all equipment, motors, control gear and all panels and the equipment contained therein.
- b) All labels and plates shall be of an approved non-corrosive material and shall be fixed with stainless steel or nickel-plated screws of ISO metric thread form.
- c) Labels shall have a matt or satin finish to minimise reflection.
- d) Labels shall have black lettering on a white background. Danger plates shall have white lettering on a red background.
- e) Cables shall be labelled at both ends, at through joints and at regular intervals.
- f) Cables shall be labelled on both sides of the place where the cable passes through a permanent obstruction.
- g) For outdoor applications labels shall be of aluminium, with letters filled in black, lightly sanded with fine grit paper and clear lacquered.
- h) All lettering shall be in uppercase letters except where standard abbreviations of units are used, e.g. kWh, kVA, etc.
- i) The wording of labels and character height shall be to the approval of the Engineer.
- j) All labels shall be in English. In addition to the English text, all Warning/Danger labels shall also be in the regional indigenous language.

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C3.3.4.2.1.12 E100.1.12 CLEANING AND PAINTING

- a) The cleaning and painting of all exposed surfaces of all plant and accessories, unless otherwise specified or approved, shall be carried out as follows:
 - Surface preparation
All metal work shall be thoroughly cleaned by blast cleaning or pickling, to be free of all mill scale, dirt, rust, welding slag and spatter, grease and all other contaminants and to present a dry, bright metallic finish.
 - Priming
The metal work shall be primed with an approved primer which, for equipment intended for outdoor use, shall be red lead based and for indoor mounted equipment shall be phosphate based.
 - Finishing
The primed surfaces shall be finished with a minimum of two coats of approved alkyd-based enamel of which each coat shall be of a different shade.
- b) Epoxy powder coating will be considered as alternative, for indoor applications, subject to the approval of the application procedure by the Engineer.
- c) Top and bottom plates of chassis compartments assemblies and chassis runners may be protected against corrosion in an alternative approved manner (e.g. by passivated cadmium plating) due to the likelihood of damage to paint work on removal and replacement.
- d) All painting shall be spray applied using dry oil-free air.
- e) The final paint thickness shall be not less than 0,1 mm as determined by a magnetic film thickness gauge.

C3.3.4.2.1.13 E100.1.13 WATER AND DEBRIS ACCUMULATION

All outdoor equipment must be designed so that water and debris will not readily accumulate to cause deterioration of equipment or an electrical discharge hazard. Where this cannot be avoided such places shall be easily accessible for cleaning.

C3.3.4.2.1.14 E100.1.14 INSPECTION AND TESTS

- a) All equipment will be inspected and tested, both in the factory during manufacturing and on site during installation. The tests required are prescribed in the standard and detail specification. The Engineer will do all inspections accompanied by the Contractor and the Contractor shall perform all tests with the Engineer as witness.
- b) The Engineer will require seven (7) days notification to avail himself for any tests or inspection. The Contractor shall arrange for the maximum number of tests and inspections to be done on the same day.
- c) The Contractor shall provide all testing facilities and instruments and all equipment and labour required for a test or inspection. All instruments shall be adequately scaled for the application. All testing facilities and instruments remain the property of the Contractor.
- d) All instruments used shall have a valid test certificate issued by an accepted testing authority. The Engineer reserves the right to call for a calibration test on any instruments used during the test.
- e) The Contractor shall ensure that the equipment is ready for testing or inspection and that the equipment conforms to the specifications before the Engineer is requested to witness tests or inspections. Should it be found that the equipment or contract works is not ready

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for testing/inspection, or does not conform to the specification, the Engineer reserves the right to charge the Contractor for any re-tests or subsequent costs.

- f) On satisfactory completion of the commissioning and inspections the contractor shall test the entire installation, as per SANS 10142-1 requirements.
- g) The contractor shall issue a Certificate of Compliance to the engineer, upon successful completion of the installation test.

C3.3.4.2.2 E100.2 GENERAL DESIGN

C3.3.4.2.2.1 E100.2.1 SCOPE

This section covers the factory and on-site testing and commissioning requirements for all equipment supplied and installed under this contract. The procedures described are the minimum required and additional tests/requirements are specified in the relevant standard and detail specifications.

C3.3.4.2.2.2 E100.2.2 TESTING SEQUENCE

- a) The testing to be performed on site is divided into two sections as follows:
 - Before official commissioning commences the Contractor shall test his equipment as described below to ensure that the plant has been installed correctly.
 - After the Contractor has been satisfied that his equipment is in running order, the commissioning of the plant will commence as described below.

C3.3.4.2.2.3 E100.2.3 SITE TESTING OF EQUIPMENT PRIOR TO COMMISSIONING

- a) The Contractor shall timeously inform the Engineer when he intends to perform his first tests and start-up of equipment in order to allow a representative of the Engineer to witness the tests.
 - Before starting up any section of the mechanical plant or filling tanks and sumps with liquid, the Contractor shall clean out the tanks, pipes, fittings, equipment or structures, and, if necessary, make arrangements with other Contractors to remove their building rubble from the structures, check that all safety devices and alarms have been set and activated, all nuts have been tightened correctly, that all the equipment is complete and ready for start-up, that the plant has been installed correctly, and that three copies of the operating manuals have been handed over to the Engineer.
 - Each section of the equipment shall be started up by the Contractor, who shall ensure that all oil fillings, lubrication, vibration monitoring, etc., have been correctly completed. In addition, he shall be responsible for the first re-filling of all the lubricating oils as well as for adjusting the plant to operate according to specification. Before any equipment is started or energized, the Contractor shall ensure that it is safe for personnel and equipment on site to do so. Allowance for these costs shall be made in his tendered rates and sums.
 - The Contractor shall conduct his own tests on the equipment and, only when he is satisfied that these tests meet the requirements of the specifications, shall he notify the Engineer that he is ready to conduct the official tests on completion. The Contractor shall not conduct an official test without the Engineer being present or his approval to do so. All equipment tested shall conform to the requirements specified.

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C3.3.4.2.2.4 E100.2.4 COMMISSIONING

- a) The Contractor shall be responsible for commissioning all sections of the works and shall perform all the tasks set out below:
 - Prior notice of and proper arrangements for the commissioning shall be made with the Employer, Engineer, supply authority, and all electrical Contractors and suppliers of equipment, which will be affected by the commissioning operation.
 - If plant and equipment, which has been supplied by others has to be commissioned, the supplier's specific permission thereto, together with any specific requirements relating to commissioning shall be obtained prior to commissioning.
 - All sections of the works shall be carefully inspected by a responsible representative of the Contractor to ensure that all construction and installation work has been properly completed.
- b) Commissioning and testing on site shall be carried out by experienced personnel under the Contractor's supervision.
- c) All pre-commissioning tests and checks shall be agreed with the Engineer prior to the commencement therewith.
- d) When all the tests required before commissioning, or tests before tests on completion, have been completed and accepted by the Engineer, the commissioning may proceed. The commissioning period shall be undertaken over a trouble-free period of at least thirty consecutive calendar days. During this period the Contractor shall instruct the operating staff in the correct procedures of operating the plant under all circumstances of operation, including emergency conditions, the correct servicing of every part, the type of oil or grease to be used, and similar instructions. This shall be done by demonstration and confirmation in writing and operating manuals shall be referred to for this purpose.
- e) At least four weeks before commissioning commences the Engineer will be requested to provide the Contractor with commissioning sheets for all the equipment installed by the Contractor. These forms shall be completed by the Contractor during the commissioning period and all items listed shall be entered. Final hand-over certificates will not be issued for equipment with incomplete commissioning reports. Information that is not available or applicable, or reasons for not performing certain tests shall be agreed with the Engineer.
- f) The thirty-day commissioning period will commence with a day-one test and terminate with a day-thirty test in compliance with the commissioning report. Commissioning of the plant (which includes the thirty days between the day-one and day-thirty tests) shall include operating under conditions which shall adequately prove that all the specifications are met. All safety devices, stand-by plant, automatic controls and protection devices shall be adequately tested for reliability and correct functioning. The Contractor may be called upon to repeat testing during the maintenance period if the performance of any equipment supplied under this contract is suspected to be substandard by the Engineer. Such tests shall be for the Contractor's account and shall comply with the requirements specified. Copies of updated commissioning reports shall be provided to the Engineer within two days after a test has been performed.
- g) After the Contractor has provided training to the Employer and provided all other contractual requirements have been met, the latter will sign the commissioning report.
- h) Once a commissioning report is complete, the Engineer and the Contractor will sign and date the report, whereupon the Engineer will notify the Employer that maintenance for that particular piece of equipment from then on is the Employers responsibility in compliance with the general conditions of contract.
- i) Programs for the day-one tests, day-thirty tests and instruction/training sessions with the client shall be prepared by the Contractor and provided to the Engineer no less than two weeks before

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the commissioning period commences. Weekly updates to these schedules shall be provided by the Contractor for the duration of the commissioning period.

- j) Note that if any equipment should fail during the 30-day commissioning period, the equipment shall be repaired or replaced by the Contractor and testing and commissioning will commence from scratch.
- k) During the thirty-day commissioning period, the Contractor shall be responsible for providing all labour and materials (including testing equipment) and shall carry out all the servicing and any adjustment of the plant required for ensuring that it operates as specified. Valid calibration certificates shall be available for all testing equipment on site during the commissioning period.
- l) The Contractor shall conduct all the tests required to satisfy the Engineer that the plant is capable of performing in accordance with the specification and shall make allowance therefore in his tendered rates and prices. Any defects detected during the commissioning period shall be made good, by and at the expense of the Contractor, including all additional costs incurred by the Employer and his representatives and the Engineer. These tests shall be conducted to certify that the plant, as installed, is operating in accordance with the specified requirements. Note that all equipment will be tested as part of a system, where appropriate, and will not be passed if all protection devices, interlocking with other equipment, etc., are not fully functional.
- m) On satisfactory completion of the commissioning and inspections the contractor shall test the entire installation, as per SANS 10142-1 requirements.
- n) The contractor shall issue a Certificate of Compliance to the engineer, upon successful completion of the installation test.

C3.3.4.2.2.5 E100.2.5 MEASUREMENT AND PAYMENT

- a) All costs for equipment, labour and other expenses for the on-site testing and commissioning of equipment shall be included in the tendered rates set out in the measurement and payment clauses of each piece of equipment and in the schedule of quantities. Any additional tests specified in the standard and detail specifications shall also be included in the tendered rates.

C3.3.4.2.3 E100.3 LOW VOLTAGE CABLES

C3.3.4.2.3.1 E100.3.1 SCOPE

- a) Application
 - This document specifies the standard requirements for the supply, delivery to site, site installation, site testing, commissioning and handover of Low Voltage cable systems.
 - This document specifies the standard requirements for the design, installation, testing and commissioning of electrical installations operating on voltages up to 1 000 volts AC / 1 500 Volts DC.
 - The primary intention of this specification is to ensure the provision of an electrical installation, which has been designed and constructed to ensure safe, reliable, operation and to facilitate safe inspection, testing and maintenance.
 - Note, however, that this specification only covers such installations (or sections of installations) that are covered by SANS 10142-1. Note also that certain provisions of this specification are inappropriate for direct application to installations where additional measures (such as earthing, intrinsic safe equipment, etc.) are required by SANS 10142-1 and SANS 10108 (i.e. medical and hazardous locations). For these types of installations, SANS 1411.

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b) Electrical System Characteristics

- The design of the installation shall comply with SANS 10142-1.
- The design of the installation shall consider the following supply characteristics:
 - Voltage, frequency and number of phases
 - Maximum prospective short circuit current (phase to phase and phase to neutral)
 - Type of system, e.g. TN-S, TN-C-S
 - Maximum earth loop impedance of the earth fault path external to the installation
 - Type and rating of the cut-out or switch device
 - Load capability of the supply source, particularly the effects on the supply voltage of the starting of new equipment
- c) The installation of protective devices shall be correctly co-ordinated within the installation and with respect to existing installations. Discrimination studies shall be performed to validate the co-ordination of the installation.
- d) All equipment which requires operation or attendance by a person, or requires cleaning or maintenance in service, shall be constructed and installed to allow adequate and safe means of access and adequate working space for such activities.
- e) Where additions or alterations to an existing installation are to be performed, the rating and condition of existing equipment, including that associated with the supply, shall be verified to confirm its suitability to carry any additional load. The earthing and equipotential bonding arrangements shall also be verified. No addition or alteration shall have an adverse effect on the existing installation.

C3.3.4.2.3.2 E100.3.2 STANDARDS

a) Associated Documentation

- This Specification identifies the Employer’s standard modifications and requirements which shall be applied to the statutory and recognised standards. The detailed specification of the project or site-specific requirements will be found in the Particular Specification and its accompanying Technical Data Sheets, which shall be read in conjunction with this Specification.
- Any items not specifically detailed in this Specification, which are necessary to provide a safe and fully operational working system, shall be deemed to be included.
- The Contractor shall operate an auditable quality assurance procedure covering the design, construction, inspection and testing of the installation.

b) Regulations, Specifications and Standards

- The design, construction, inspection and testing of the installation shall comply with all relevant Statutory Regulations and Directives including:
 - Occupational Health and Safety Act (Act 85 of 1993)
 - Construction Regulations 2003 issued in terms of Section 43 of the Act

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- Local Fire Regulations; and
- Regulations of the Local Supply Authority

and the latest editions (current at the time of Tender) of all relevant South African National Standards, as well as International Standards, including but not limited to:

Table 1 Section 3: Reference Standards

| Standard Number | Description |
|-----------------|--|
| SANS 1213 | Mechanical cable glands |
| SANS 1411 | Materials of insulated electric cables and flexible cords |
| SANS 1507 | Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) |
| SANS 10199 | The design and installation of earth electrodes |
| SANS 10225 | The design and construction of lighting masts |
| SANS 10142-1 | Wiring of Premises Part 1: Low Voltage Installations |
| SANS 60614-2 | Conduits for electrical installations - Particular specification for conduits |
| IEC 50086 | Conduit systems for cable management |

- The installation shall also comply with:
 - This Specification, including all Technical Data Sheets; and
 - Any documentation issued by, or on behalf of, the Employer in respect of the Installation

C3.3.4.2.3.3 E100.3.3 GENERAL

a) General

- Cables shall be manufactured strictly in accordance with SANS 1507.
- Cables shall be delivered within 12 months of manufacture and shall be delivered to site on cable drums or coiled with protective wrappings.
- Cables shall be delivered, stored and handled in accordance with the manufacturer's instructions. Where the performance of the cable is likely to be adversely affected by the ingress of moisture, it shall be adequately sealed at both ends.
- The end protruding from the drum shall be protected against mechanical damage.
- Cable selection and sizing should comply with SANS 10142-1. Cables and their wireways shall, where required by SANS 10400 Part T to be protected against the effects of fire, be selected and installed in accordance with the provisions of such code.
- Cables shall have copper or aluminium conductors according to SANS 1411-1. Cores of cross-sectional area greater than 1,5 mm² shall be stranded or flexible.
- Where neutral conductors are to be provided, they shall be of the same cross-sectional area as the associated phase conductor, unless otherwise specified in the Particular Specification and drawings.

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C3.3.4.2.3.4 E100.3.4 LOW VOLTAGE CABLES

a) Types of Low Voltage Cables

- Unless otherwise specified, all LV cables shall have copper conductors to SANS 1411-1. Cores of cross-sectional area greater than 1,5 mm² shall be stranded or flexible. Where neutral conductors are to be provided, they shall be of the same cross-sectional area as the associated phase conductor, unless otherwise specified in the design documentation and drawings.
- All LV cables used in an electrical installation shall be as specified in the Particular Specification (or cable schedule as part of the Particular Specification) and shall comply with either of the following:
 - PVC/AWA/PVC and PVC/SWA/PVC
 - Cables shall comply with SANS 1507-3 and be rated at 600/1000 V.
 - Single core cables shall have aluminium wire armouring.
 - Multicore cables comprising five conductors and above shall have each core individually coloured, or, where not available, be coloured white with phase identification in black numerals.
 - XLPE/AWA/PVC and XLPE/SWA/PVC
 - Cables shall comply with SANS 1507-4 and be rated at 600/1000 V.
 - Single core cables shall have aluminium wire armouring.
 - PVC/PVC
 - Cables shall comply with SANS 1507-3 and be rated at 600/1000 V.
 - XLPE/PVC
 - Cables shall comply with SANS 1507-4, and be rated at 600/100 V.
 - Single Core PVC
 - Cables shall comply with SANS 1507-2 and be rated at 600/1000 V.
 - The insulation shall be phase coloured, and, where used in single phase systems, line cables shall be red, neutral cables black and earth cables yellow and green.
 - Flat Twin and Earth PVC
 - Copper conductors shall comply with SANS 1411-1, PVC insulated to SANS 1411-2, laid up with a bare copper earth continuity conductor between them, with PVC bedding to SANS 1411-2.
 - Cables shall be rated at 300/500 V.
 - Fire Resistant Cables
 - Cables requiring protection against the effects of fire shall be of fire-resistant construction (note here that “fire-rated” cables are not the same as “fire-resistant” cables).

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- Fire-resistant cables shall thus comply with SANS 60331-21 and / or BS EN 50200.
- Except where prior approval in this regard has been granted by the Engineer, increasing the resistance to fire of normal (i.e. non-fire resistant) cables though the application of a coat of fire-resistant compound will not be accepted.

b) Cable Accessories

- Cable Markers

Concrete markers for the indication of cable or trench routes shall be placed at a minimum of 50 m intervals, changes in trench or cable direction and at road crossings. The markers shall protrude by 25 mm above finished ground level, except where they are likely to cause obstruction, when they shall be laid flush with the finished ground level.

C3.3.4.2.3.5 E100.3.5 INSTALLATION OF CABLES

a) General

- The cable installation shall comply with the requirements of SANS 10142-1.
- Cables shall be installed strictly in accordance with the cable route drawings.
- Cables installed in groups shall run in straight lines and not cross over each other, except where transposing of cables is required to reduce capacitive or inductive effects.
- Cables installed above ground shall, as far as possible, run parallel with the lines of building construction. Cables and wireways shall then only be installed in horizontal and vertical runs, and the installation shall be as visually unobtrusive as possible.
- Cables buried below ground shall, as far as possible, follow features of the site such as roadways and building lines.
- Where a redundant cable installation is required, the cables shall not be installed along the same route, and their routes shall be through separate fire compartments (except where no separation occurs, as may be the case in the vicinity of the source and load).
- Cables and their support systems shall not be fixed to protective barriers, guards or directly to guard-rails.
- Cables shall not be exposed to direct sunlight after installation. If the cable route compels the support system to be in direct sunlight, the Contractor shall ensure cables are covered with a suitable canopy or cover of the same material as the support system (tray). Cables shall be installed strictly according to the manufacturer’s requirements pertaining to:
 - Maximum tensile or compressive stresses (e.g. due to pinching or squashing)
 - Minimum bending radii
 - Temperature of installation; and
 - Operating environment
- No joints or repairs to outer sheathings or insulation shall be allowed in low-voltage cables without the prior approval of the Engineer.
- Propriety (i.e. suited to and manufactured for such use) cable support systems shall be used.

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- Unarmoured cables shall only be used where there is no risk of mechanical damage.
- Fire resistant cables shall only be supported by fire resistant cable support systems.
- After cable installation, the open end of all cable sleeves and the openings in building structures specifically provided for the passage of cables (including unused openings) shall be fire sealed to SANS 10177 Part 2, thus preventing the ingress of harmful or flammable gases, liquid, smoke, fire and vermin.

b) Separation of Cables

- Cables shall be classified as follows:

Table 2: Cable classification

| | AC | DC |
|--|--------------|------------|
| High Voltage | > 1000 Vrms | > 1500 V |
| Low voltage (power, control, small power and lighting) | 50–1000 Vrms | 120–1500 V |
| Extra-low voltage (signal/instrument, data transmission and telecommunication) | < 50 Vrms | < 120 V |

- Except for reasons of electromagnetic compatibility, where larger separation will be required, the minimum separation distance between cables of different classifications shall be according to the following table.

Table 3: Separation distance

| Separation (mm) | Extra Low Voltage | Low Voltage | Other Services (Above Ground) | Other Services (Below Ground) |
|---|--------------------------|---|--------------------------------------|--------------------------------------|
| Extra Low Voltage | - | As specified | 150 | 500 |
| Low Voltage | As specified | 2 x cables above ground 100mm below ground | 150 | 500 |
| High Voltage Cables | 500 | 300 | 300 | 500 |
| Other Services (Above Ground) | 150 | 150 | - | - |
| Other Services (Below Ground) | 500 | 500 | - | - |
| Note: | | | | |
| 1. The above figures need not to apply to the short lengths of cables near the equipment to which the cables are connected. | | | | |
| 2. Clearances to power lines are excluded from above table as they are covered by the Electrical Machinery Regulations. Furthermore, clearances to traction lines are subject to the regulations of the relevant railway authorities. | | | | |

- The figures specified in the table above do not apply to cables that are installed in separate metal enclosures and/or cables on cable support systems (cable trays/ladders) that are separated with conductive partitions, provided such partitions are electrically bonded to earth.
- Notwithstanding above, cables of different classifications and/or purpose (e.g. data, audio or power), shall not be installed in the same duct or wireway, and the minimum separation

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distance shall be kept even when their ducts or wireways are bonded (since radio frequency interference may then still be exhibited).

When cables have to cross, the crossing shall be at right angles.

c) Cable trenches in ground

– General

- The proposed trench route shall be surveyed for the presence of underground cables and/or services before digging commences.
- The site shall be preserved as far as possible. Only the minimum of trees, shrubs, rocks, etc. shall be removed and cleared for the cable route.
- Where surplus material has to be disposed of, the Contractor shall remove it from site and dispose of it in a location of his choosing in accordance with statutory environmental regulations.

– Excavation

- The cable trench shall be excavated along the routes indicated on the relevant drawings.
- Should the Contractor, during the excavation operations, come across obstacles (or other interferences, e.g. soil drenched with hydrocarbon-based solvents such as spilt oil, which could adversely affect cable insulation), the Contractor shall report the matter to the Engineer, who shall then advise an appropriate course of action.
- Trenches shall be dug to within the dimensional tolerances given by SANS 1200, parts DB and LC.
- Where the Contractor cannot excavate by means of machines, due to limited access and the proximity of other services, excavations shall be by hand.
- The bottom of the trench shall be level and shall follow the contours of the final ground level. Where the excavation is in excess of the required depth, the excavation shall be backfilled and compacted with suitable material to the required depth.
- The Contractor shall trim the trenches and clean up the bottom of the trenches after he has completed the required excavation.
- The Contractor shall remove all sharp projections, which could damage the cable where the trench is excavated through rocky formations, and shall remove all loose rocks, material, etc. from the bottom of the trench.
- No excavated material shall be left closer than 300 mm from the side of the excavation.
- Once the excavations for cable trenches have been completed, the Contractor shall give the Engineer one working day notice to inspect the trench and to be present when the measurements are made.
- The Contractor shall maintain the excavation in a good condition, free of water, mud, loose ground, rocks, stones, gravel and other strange material until the cables are installed.

– Installation of cables directly in ground.

- Dimensions of trenches for the installation of cables directly in ground

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- Trenches shall be excavated as follows:

Table 4: Excavation of trenches

| | Width | Depth |
|-------------------------|--------------|--------------|
| Telecommunication Cable | 450 mm | 650 mm |
| LV Cable | 450 mm | 650 mm |

- However, the following minimum clearances shall be maintained:

Table 5: Minimum clearances

| | Vertical | Horizontal |
|-------------------------|-----------------|------------------------------------|
| Data and Telecom Cables | 300 mm | 300 mm |
| Water pipes | 300 mm | 300 mm |
| Sewer pipes | 300 mm | 800 mm |
| Storm water pipes | 300 mm | 600 mm |
| LV cables on same route | 100 mm | One cable diameter of larger cable |

- Where a cable will cross over other services, the cable shall not be installed at a depth less than 600 mm below ground level, and if this is not possible the cable shall be installed underneath the other service and shall be protected in the prescribed manner by means of concrete slabs. The depth of the cable shall be maintained for one metre on either side of the crossing.
 - If it is not possible to cross over or underneath a service in the prescribed manner, the matter shall be referred to the Engineer for a decision.
 - Where more than one cable needs to be installed in a trench, the width of the trench shall be increased with a distance equal to the clearance required.
- Sand bed and sand bed cover for cables
- A sand bed layer of soft soil shall be installed and levelled at the bottom of each trench after the trench has been approved by the Engineer, and prior to cable laying.
 - If the excavated material is not suitable for the sand bed layer, then suitable soil shall be imported for this purpose. Quarried sand, man-made sand, sand clay and loam are usually suitable; sea sand, river sand, clay, chalk, unmixed oukclip, peat and mine sand may not be used. The cost of importing shall be included in the price for the excavation.
 - The minimum thickness of the sand bed layer shall be 50 mm.
 - If the soil for the sand bed and sand cover has to be sifted, a sieve with holes not larger than 6 mm shall be used.
 - The cable shall, after the completion of the trench, be laid as soon as possible so that the trench can be backfilled.
 - The sand bed cover for LV cables shall be 150 mm thick, of similar soil and shall be placed directly after the cable(s) has been inspected by the Engineer.
 - Only one cable shall be laid at a time and the Contractor shall take precautions that the cables which are already installed are not damaged.

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– Laying of cables

- Cable rollers shall be used when cables are drawn into trenches. The cable rollers shall be placed so that the cable does not touch the bottom or the sides of the trench.
- If the Contractor intends using a winch to draw the cable into the trench, a cable stocking shall be used or the draw wires shall be soldered to the cable, such that the tension is exerted on all the cores, lead sheath and/or steel wire armoring at the same time.
- The maximum tension on a cable during laying operations shall not exceed the value specified by the manufacturer.
- Sufficient lengths of cable shall be left at the beginning and end of the cable routes to allow for the termination of the cables. The Contractor shall take the necessary precautions to protect the cable ends until they are terminated. The cable ends shall be sealed by means of lead or heat-shrink sealing caps to ensure that the cable is waterproof.
- Where cables are drawn through sleeves, care shall be taken that they are not kinked or excessively bent.
- The Contractor shall keep accurate records of each length of cable laid. The following information shall be recorded:
 - i) Cable drum number
 - ii) Size of cable
 - iii) Position of where the cable has been installed, i.e. the starting and finishing points
 - iv) Length of cable
 - v) Date of installation
- The Contractor shall be liable for the repair of cables due to the faulty manufacture, should this information not be recorded directly after the cable has been laid.
- The Engineer shall inspect all cable trenches before backfilling to ensure that the laying of cables complies with the specification.

– Backfilling of trenches

- When the cable has been laid, inspected and approved and the sand bed cover has been installed, the trench shall be backfilled with soil containing not more than 40% rock or shale which shall be able to pass through a 100 mm sieve and which is approved by the Engineer.
- Where more than 40%, but less than 70%, rock occurs, the Contractor shall replace the rock with imported soil. However, should more than 70% rock occur then all the backfilling material shall be imported.
- The Contractor may import further stone-free material to the site or sieve the excavated material for sand bedding and cover, but payment shall only be compensated for the actual quantity of imported material required as determined by the Engineer. The quantity of imported material required shall be calculated from the nominal trench width.

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- The excavated material shall be backfilled in layers of 150 mm and shall be well compacted and consolidated to 90% MOD AASHTO. Where the Engineer deems necessary, the Contractor shall use a mechanical vibrator to compact the trench.
 - The Contractor shall maintain the completed sections of the cable trench in a proper safe condition for the duration of the contract. The Contractor shall refill and compact the trench where subsidence occurs.
 - After completion of the work the route of the cable shall be neatly finished off and cleared. All stones bigger than 25 mm, as well as all loose organic material and rubble, shall be removed.
 - Electrical warning tape, consisting of two tapes laid side-by-side and overlapping (such that their combined width is 150% of a single tape width), shall be installed on all cable routes (LV and MV), 200 mm above the top cable layer. Where a cable route exceeds 600 mm in width, multiple warning tapes shall be run, in such a way that the space between adjacent warning tapes does not exceed 150 mm.
- Installation of concrete slabs

Where cables cross other services such as water pipes, sewage pipes and other cables, or where the chance exists that the cable may be damaged as a result of excavation by others, the cable shall be protected by means of reinforced concrete slabs. The slabs shall protect the cable for a distance of 500 mm on either side of the crossing.

c) Cable Sleeves

- General
- The construction of sleeves draw pits and associated earthworks shall be in accordance with SANS 2001-DP3.
 - Sleeves shall be PVC unless otherwise specified.
 - The sleeves shall have a minimum wall thickness of 5 mm and mass not exceeding 45 kg per sleeve length.
 - Where a change of direction is required, draw pits shall be constructed. Bends may only be used where prior approval has been granted by the Engineer. Where such approval has been granted, the maximum angle of a single bend in a sleeve shall be:
 - i) 45°, when all cables have a diameter less than 35 mm; or
 - ii) 22.5°, where any cable has a diameter greater than 35 mm.
 - All bends shall be of the long radius type.
- Method of Laying
- In order to facilitate future location of the sleeves, they are to be installed strictly in accordance with the relevant drawings.
 - The Contractor shall select the number and/or dimensions of sleeves such that an additional cable, of outside diameter equal to 20% of the sum of the outside diameters of the installed cables, can be pulled into the sleeve at a future date. Under roadways, this spare capacity shall be 50%. Notwithstanding above requirement, a minimum of two sleeves shall be installed under all roadway crossings.

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- When installed beneath roads, there shall be a minimum of 750 mm of cover above the crown of the sleeve, and the sleeve shall be extended to 1,5 m on either side of the road surface or kerb face.
 - Where sleeves are installed during road construction, the sleeve positions shall be marked with the letters "E" or "ESC" for electrical, and "TEL" for telecommunication sleeves, cut or cast into the concrete of the kerb (or concrete marker, should the road be without kerbs). The grooved letters shall also be painted red, to facilitate easy identification.
 - The sleeves shall be laid straight to within the dimensional tolerances given by SANS 1200-part LC.
 - After installation, all foreign matter in the pipe shall be cleared.
 - The sleeves shall be sealed with PVC plugs to prevent the entry of sand before backfilling.
 - Precautions shall be taken to prevent damage to the sleeves during future construction activities.
 - All sleeves shall be left with an 8 mm diameter nylon draw wire, or draw wire to SANS 2001-DP3, in place, anchored at each end.
- Bore and Sleeve Jointing
- The bore shall be accurate, smooth and without surface cracks, and the inside edges edged or rounded.
 - The edging or rounding shall be such that no ridge is formed when two sleeves are joined.
 - A suitable slip collar, or other simple device, shall be provided to maintain the 5 mm spacing after the installation of the sleeves.
 - Joints shall be carried out with suitable couplings to prevent movement between pipe ends.
 - Joints shall be flexible enough to allow angular adjustments of up to 5° between adjacent lengths of sleeves during installation and afterwards to allow for subsequent subsidence of the ground.
 - The joints need not be watertight but shall stop sand and other materials entering the sleeves.
- Draw pits and masonry
- Where they are to be constructed in residential or commercial zoned areas, and where part of the draw pit will be visible above ground, the masonry units to draw pits shall be FBS (face brick standard). All other draw pit builds shall utilize solid concrete units.
 - Draw pits covers shall be of cast iron manufacture, or as specified in the particular specification.

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C3.3.4.2.3.6 E100.3.6 MARKING AND LABELLING OF CABLES

a) Low Voltage Cables

- Conductors and/or cables shall be identified at both ends by cable markers, consisting of plastic sleeves with pre-printed, legible and indelible alpha/numeric element inserts. The plastic sleeves shall fully encircle the conductor and/or cable. The markers shall be suitable for the intended environment, for instance, UV resistant where installed in sunlight, etc. Reference character sizes shall not be less than 3 mm high.
- The colours of conductor PVC insulation shall comply with SANS 10142-1, par. 6.3.3. The colours of conductors for sub-circuits shall as far as possibly correspond with the colour of the supply phase. Except in the case of multi-way switching, the colour of a conductor may not change at any point along its run, starting from its point of origin at a circuit breaker inside the switchgear assembly. In other words, where loop wiring is employed, the colour of conductor insulation shall be the same throughout the circuit.

C3.3.4.2.3.7 E100.3.7 DRAWINGS AND DOCUMENTATION

a) General

- All drawings, information, and documentation shall be in English, and each item shall be identified with:
 - The Client’s name and contact details
 - Client’s project / scheme / contract reference title and numbers
 - The Engineer’s name and contact details
 - Engineers reference numbers
 - Contractor’s work / contract / order references
- Drawings for acceptance shall be provided on A4 or A3 paper copies as specified.

b) Drawings for Approval

- The following documentation and drawings shall be submitted to the Engineer prior to the installation of cables and wireways and before civil construction have started on the areas where cable routes are required:
 - Cable route layout drawings showing
 - Type of wireways
 - Trenching
 - Cable junction boxes

c) As-built Drawings

- The Contractor shall produce detailed “as-built” drawings, clearly labelled as such, and consisting of 3 sets of drawings printed to their original size. Where the original drawings were larger than A3, 3 sets of printed drawings scaled to A3 size will be supplied. The A3 drawings will not have any information omitted from the printed area. The drawings will indicate the positions of the following:
 - Wireways (e.g. trenches, conduit, cables ladder/trays, power skirting etc.)

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- Cable routes (including any cable joints)
- General arrangement drawings
- Single line diagrams

d) Operating and Maintenance Manual

- Three Operation Manuals, three Maintenance Manuals and three Certification copies shall be provided for all equipment supplied. The manuals shall be in A4 format.
- The operating and maintenance manuals shall include at least the following:
 - A schedule of installed components and equipment, containing the following information:
 - i) Manufacturers name and contact details
 - ii) Circuit number (DB name, circuit breaker e.g. DB01-CB08); and
 - iii) Function (e.g. switching lighting circuit DB03-L1)
 - A schedule of all installed cables, with the following information:
 - i) Circuit number (DB name, circuit breaker e.g. DB01-CB08)
 - ii) Size
 - iii) Installed length; and
 - iv) Function (e.g. “Feeding Submersible pump IW-SP-01”)
 - Description and details of:
 - i) Detailed description of the function of all operator controls
 - ii) Procedures for fault finding
 - iii) Maintenance instructions for all components and including repair, overhaul, change-out and installation procedures
 - iv) Inspection schedules; and
 - v) Spare parts information and recommended spares

C3.3.4.2.3.8 E100.3.8 TESTING AND COMMISSIONING

a) General

- The installation shall be inspected and tested in accordance with SANS 10142-1.
- Inspection and testing shall only be performed by personnel with approved, current qualifications. The Contractor shall provide qualified personnel for the supervision for all inspection and testing activities.
- The Contractor shall provide all necessary safety equipment and test instruments. All test instruments shall comply with SANS 61010 and have an up-to-date test and calibration certificate.

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- The Contractor's safe working arrangements shall comply with the safety management systems and procedures prevailing on site. Where there may be a risk of injury to personnel, the Contractor shall submit a risk assessment and method statement for approval, prior to starting work.
- Unless otherwise specified in the Particular Specification, all inspection and test results shall be recorded using pro forma documentation (test certificates and schedules) complying with SANS 10142-1.
- The Contractor shall make provision for all inspection and testing activities to be witnessed. Unless otherwise specified in the Particular Specification, the period of notice for witness testing shall be 5 working days.
- Where most of the inspection and testing activities are not witnessed, the Contractor shall allow for 10% of the inspection and testing activities to be repeated for witness testing.
- If there is a requirement for additional inspection and test activities to be performed as part of the commissioning process, this shall be specified in the Particular Specification.
- Unless otherwise agreed by the Employer, no part of the installation shall be commissioned until all defects or omissions revealed by inspection and testing have been rectified. Where a defect or omission renders all or part of the installation unsafe for use, the Contractor shall take approved precautions to ensure that no part of the installation can be commissioned.

b) Test Sequence

- Inspections before testing:
- Before testing, inspections shall be performed to verify:
 - All equipment and material are of the correct type and complies with applicable SANS and IEC standards
 - All parts of the installation are correctly selected and erected
 - No part of the installation is visibly damaged or otherwise defective
 - The installation is suitable for the environmental conditions; and
 - The installation complies with this Specification
- Testing of Installation
 - On satisfactory completion of the commissioning and inspections the contractor shall test the entire installation, as per SANS 10142-1 requirements.
 - The contractor shall issue a Certificate of Compliance to the engineer, upon successful completion of the installation test.

C3.3.4.2.4 E100.4 LOW VOLTAGE SWITCHGEAR AND CONTROL GEAR ASSEMBLIES

C3.3.4.2.4.1 E100.4.1 SCOPE

a) Application

- This Standard Specification defines the requirements for the design, construction, installation, inspection, testing and commissioning of LV switchgear and control gear assemblies (Assemblies), including distribution boards (DBs), motor control centres (MCCs), single standalone motor starters or controllers, control panels (either standalone or forming

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an integral part of the Assembly), control desks and consoles. Where this type of electrical equipment is incorporated within a plant supply package, the provisions of this Specification shall also apply.

b) General Requirements

- An Assembly shall incorporate all components and equipment necessary to achieve the
- All materials, components, and equipment used in the manufacture of the Assembly shall be new and unused, shall be of current manufacture, and shall be free from any defects or imperfections.

C3.3.4.2.4.2 E100.4.2 STANDARDS

a) Associated Documentation

- This Specification contains standard amendments and requirements which shall be applied to the referenced statutory and national standards. The project-specific requirements are provided in the Detail Specification, which shall be read in conjunction with this Specification.
- The design, construction, installation, inspection, testing and commissioning of the Assembly shall comply with all relevant statutory regulations, and the latest editions (current at the time of Tender) of all relevant South African National Standards.
- The manufacturer shall operate an approved, auditable quality assurance system covering the design, construction, inspection and testing of the Assembly.

b) Statutory Requirements

- The Assembly as manufactured, and as installed on site, shall comply with the following:
 - Occupational Health and Safety Act of 1993
 - Manufacturer's specifications and installation instructions

c) Reference Standards

- The Assembly and all its constituent components and equipment shall comply with the latest published edition of all relevant national standards, including the following:

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Table 6: Section 4: Reference standards

| Standard Number | Description |
|------------------------|---|
| SANS 152 | Low-voltage air-break switches, air-break disconnectors, air-break switch-disconnectors, and fuse-combination units |
| SANS 156 | Moulded case circuit-breakers |
| SANS 172 | Low Voltage Fuses |
| SANS 1091 | National colour standards for paint |
| SANS 1973 | Low-voltage switchgear and control gear assemblies |
| SANS 9000 | Quality management systems |
| SANS 10108 | The classification of hazardous locations and the selection of apparatus for use in such locations |
| SANS 10142 | Standard Regulations for Wiring of Premises. |
| SANS 60044 | Instrument Transformers |
| SANS 60204 | Safety of machinery. Electrical equipment of machines. |
| SANS 60269 | Low-voltage fuses. |
| SANS 60439 | Low-voltage switchgear and control gear assemblies |
| SANS 60529 | Degrees of protection provided by enclosures (IP Code) |
| SANS 61558 | Isolating transformers and safety isolating transformers. |
| SANS 60947 | Low-voltage switchgear and control gear |
| SANS 61000 | Electromagnetic compatibility (EMC) |
| SANS 61643-1 | Low-voltage surge protective devices Part 1: Surge protective devices connected to low-voltage power distribution systems |

C3.3.4.2.4.3 E100.4.3 CONSTRUCTION REQUIREMENTS

a) General

- Assemblies shall be designed and constructed to facilitate inspection, cleaning, repair and maintenance and to ensure absolute safety during operation, inspection and maintenance.
- The arrangement of all circuit components / functional units shall be to the approval of the Engineer.
- Where detailed in the Detail Specification, spare compartments of a given size shall be provided within the enclosure. Each shall be equipped with a plain (i.e. un-punched) opening compartment door.
- Every spare compartment shall be sized to house a triple pole and neutral incoming short circuit protective and isolating device and shall be provided with a compartment earthing terminal.
- Every spare compartment shall be provided with a gland plate or have access to an existing cable way within the enclosure.

b) Enclosures

- All conductors and terminals that form part of the Assembly, including earth conductors and the Assembly earth bar, shall be enclosed within it. An earth stud may be provided as a part of a cable glanding facility.

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- Assemblies shall be constructed of materials capable of withstanding the mechanical, electrical and thermal stresses to which it may be subjected and the environmental and operating conditions likely to be encountered in normal service.
- All boards, panels and cubicles shall be vermin and dust proof and the minimum degree of protection shall be:

Table 7: Minimum levels of ingress protection

| Location | Description | Minimum rating |
|----------|---|--|
| Indoor | Clean, dry areas (e.g. inside substations or motor control rooms) | IP44 (doors closed) IP2X (inter-compartment & doors open) |
| Outdoor | Located outside buildings | IP65 (doors closed) IP2X (inter-compartment & doors open) |

- Where heat is generated within the enclosure, it shall, where possible, be designed to dissipate naturally from the enclosure surface. Where this is not possible, ventilation openings shall be provided that maintain the highest practicable IP rating of the enclosure, subject to a minimum of IP42. Where cooling air is drawn into the enclosure, dust filters shall be provided where practicable.
- For all variable speed drives and soft-starters (without bypass contactors) installed in indoor Assemblies, mini-extraction fans shall be installed inside the drive compartment to dissipate heat, without compromising the assembly's IP rating.
- Particular attention shall be given to the ventilation of outdoor mounted boards, to eliminate build-up of excessive heat inside the boards caused by the solar radiation or internal heat generation.
- Any internal partitions necessary to provide inter-compartmental segregation within the enclosure shall be of the same material as the sides of the enclosure.
- All the surfaces of the enclosure, and of its constituent equipment and components shall be suitably protected against the effects of any likely atmospheric corrosion present at the operating location.
- Purpose-made gland plates shall be protected against corrosion by electro-plating, galvanising, or be made of stainless steel and shall not be painted.

c) Construction of Free-Standing MCCs and DBs

- Free-standing MCCs and DBs shall be constructed from steel with a structural frame permanently clad with side plates, so as to provide a multi-compartmented structure that is rigid with all doors and covers removed, and such that it will not deform during transport or installation. The enclosure doors and covers shall themselves be suitably braced so as to be rigid and not deform or flex when fully equipped and handled.
- Each compartment formed within the enclosure for the purpose of housing components or equipment shall be provided with dedicated mounting plates for that purpose, which when removed do not expose any other compartment or live parts. Cabling shall only be terminated on or in the enclosure at gland plates provided for that purpose.
- Horizontal wireways (top and bottom) shall extend through the width of each section.
- The minimum metal thickness of the enclosure's constituent parts shall be as follows:
 - External cladding: 2 mm

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- Internal partitions: 1.6 mm
- Doors and removable panel covers: 2 mm
- Free-standing Assemblies shall be mounted on and bolted to a rigid hot-dip galvanised steel 100 x 50 x 6 mm channel base.
- The maximum height of any Assembly (including its base) shall be 2 100 mm above finished floor level. No equipment other than busbars and/or inter panel control wiring shall be installed higher than 1900 mm above finished floor height, neither shall any equipment, other than cable glands and inter panel control wiring be installed lower than 300 mm above finished floor level.
- Compartment single doors shall have vertical hinges mounted on their left-hand side, and all doors shall have an angle of opening that is limited to 95 degrees. Where specifically agreed with the Engineer, a compartment single door on a front access only Assembly may be hinged on the right-hand side if this will reduce the number of dropper / cable way chambers required. Wide compartments with dual doors shall open in wardrobe style, such that the second door is interlocked with the first.
- Any cover which is required to be removed for adjustment, access, or maintenance and exceeds 0.75m² in area, shall be provided with supporting lips, lift-off hinges, locating dowels, or handles, in order to facilitate safe removal and replacement.
- Doors and any covers shall be fixed to the enclosure using captive bolt type fasteners, and each hinged door shall be capable of being removed, following disconnection of the electrical and earthing connections. Compartment doors shall be provided with securing catches which can be locked with a padlock, as follows:
 - door ≤ 400 mm high 1 No.
 - door >400 mm high 2 No.
 - door >1200 mm high 3 No.
- The Assembly shall be constructed for front and rear access unless otherwise specified in the Detail Specification. Where the Assembly shall be designed for front access only it shall be possible to gain access to every component, item of equipment, busbar and cable from the front (or for busbars, the top) of the enclosure; whether for maintenance or for replacement.
- The form of internal separation (in accordance with SANS 60439-1) shall be as specified in the Detail Specification. Form 3b or 4a as appropriate, shall be considered the minimum allowable internal separation for MDBs and MCCs.
- Any apertures between compartments (including busbar compartments) through which the copper-work or cabling passes, shall be effectively closed off to minimise the possibility of an arc fault propagating between compartments.
- Fixings for components, component mounting plates, etc. shall not penetrate another compartment containing live parts. Where self-tapping screws are used for component fixing, they shall be of the thread forming or thread rolling type. Components, wiring, labelling, etc., shall only be located within compartments on a removable mounting plate, and in such a manner that facilitates easy inspection, maintenance, or removal and replacement, and without necessitating the removal or dismantling of any other components or wiring, or the use of special tools.
- Unless detailed otherwise specified in the Detail Specification, the Assembly shall be constructed so as to facilitate future extension by the addition of extra full height sections at

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



either end. To accommodate this, any covers, fixings, etc. shall be flush with the end faces of the enclosure, and the end sections of busbars and earth bars shall be prepared for future extension.

- The Assembly shall be constructed so as to permit it being split into sections in order to facilitate transportation and subsequent site erection. Each transportable section shall be labelled as to its shipping weight, shall be equipped with lifting eyes, which shall be removed on completion of the site erection.
- All Assemblies shall have at least 15% spare unequipped space complete with busbars, partitioning into compartments, etc. for future extensions.

d) Power distribution within an Assembly

- The power distribution and circuit protective arrangements within an Assembly shall be designed so as to co-ordinate with the characteristics of the electrical system(s) connected to the incoming terminals of the Assembly, including emergency or temporary supplies and specifically noting the following:
 - maximum prospective RMS short circuit current from all simultaneously available sources of supply, together with any fault contribution from large motors directly connected to the Assembly
 - type of system earthing (i.e. TN-S, TT, etc.), the maximum available earth fault current, and the maximum earth fault loop impedance
 - up-stream protective device ratings and settings
- Where this information is not stated in the Detail Specification, it shall be obtained from the Engineer before the design of the Assembly commences.
- Where the maximum prospective RMS short circuit current from all simultaneously available sources of supply, together with any fault contribution from large directly- connected motors, exceeds 10kA, the Assembly a Type Tested Assembly with stated deviations in compliance with SANS 1973-1.
- Where the maximum prospective RMS short circuit current is 10kA or less, the Assembly shall comply with the requirements of SANS 1973-3.

e) Functional unit short-circuit protection and isolation

- The Assembly shall be provided with separate incoming isolation for every electrical power system (including emergency or temporary supplies) connected to it.
- The connection from the Assembly power distribution system into every compartment shall be terminated on a short circuit protection device, which may also incorporate a compartment isolating device, for short-circuit protection of all the components within a functional unit.
- Every motor starter compartment shall be provided with a door interlocked isolation device, which shall isolate all sources of supply that enter the motor starter compartment. Where a functional unit; e.g. a motor starter, etc., comprises a group of interlocked compartments, the isolation device shall be located in the compartment receiving the supply.
- Every compartment containing a distribution board or low voltage transformer shall be provided with an isolation device, which may be located in an adjacent compartment. For some compartments housing power monitoring equipment or instrumentation and process control equipment, it may be appropriate to provide a means of isolation within the compartment.

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- Unless separate fuses are used as the short circuit protection device, the isolation device and short circuit protection device shall be combined. Fuses may only be used to limit fault currents if approved by the Engineer.
- Separate isolating devices shall be switch-disconnectors suitable for on-load switching. They shall be capable of being padlocked in the isolated / 'off' position at the compartment door, and at the isolating mechanism with the compartment door open. Any isolator mechanism extension shafts shall be provided with guide brackets as necessary to prevent excessive shaft deflection.
- The compartment door shall be mechanically interlocked such that it shall not be possible to open the door when the isolating device is in the 'on' / 'closed' position or when the operating handle is padlocked in the 'off' / 'open' position. Where the means of isolation is only accessible from within the compartment, it shall be protected to a level of IP2X.
- The following types of devices may be used:
 - Air circuit breaker (ACB) or moulded case circuit breaker (MCCB)
 - Fuse switch-disconnector
 - Switch-disconnector with separate fuses
- All field circuits connected to a functional unit (e.g. valve actuators, limit switches, etc.) shall be provided with isolation either by or within that functional unit.
- Where safety interlock keys are provided, e.g. to control device operation or to restrict access, they shall only be released in the safe condition, and shall be unique across that Assembly and any other Assembly installed at the same site.

C3.3.4.2.4.4 E100.4.4 ELECTRICAL COMPONENTS

a) Circuit Breakers (CBs)

- Circuit breakers shall be either air circuit breakers (ACBs) or moulded case circuit breakers (MCCBs), as indicated on the single-line diagram for the Assembly.
- CBs shall have a rated service short-circuit breaking capacity not less than that of the maximum prospective fault current at the point of connection in the power system, which shall be taken to be the busbar rated short-time withstand current specified for the Assembly. Incomer CBs shall have a rated short-time withstand current and time not less than that of the busbars.
- CBs with rated currents over 100 A shall have built-in protection, that will discriminate with both up-stream and down-stream protective devices, as appropriate to the application.
- ACBs for incomer and feeder applications shall be fitted with adjustable electronic protection. MCCBs for incomer applications shall be fitted with adjustable thermal-magnetic or adjustable electronic protection.
- An ACB shall incorporate pad-lockable cover(s) to permit the securing of the open, close, and trip actuators against inadvertent or unauthorised manual operation.
- Where an ACB or MCCB has electrically operated control circuits; e.g. opening, closing, tripping, spring charging, indication, etc., they shall be provided with individual fuse or MCB protection.
- All ACBs and selected MCCBs (as indicated on the single-line diagrams) shall be of a withdrawable pattern with the number of poles indicated on the single-line diagram.

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- A withdrawable ACB or MCCB shall be provided with clearly visible carriage position indication (connected/disconnected/test) and shall be capable of being locked in each position. Mechanical interlocks shall be provided that only permit movement of the carriage whilst the main circuit contacts are in the 'OFF' position. It shall be possible to test the control circuits of an ACB with it partially or fully withdrawn.
- As a withdrawable ACB or MCCB is being withdrawn, pad-lockable safety shutters shall automatically cover over the supply side and the load side fixed connections. These shutters shall be capable of independently being opened for testing purposes.
- One (only) handling truck shall be provided suitable for each type of withdrawable ACB or MCCB supplied as a part of the Assembly, or as a part of any other Assembly supplied to the same building housing the Assembly.
- Special maintenance tools, where required, shall be provided with each breaker.
- Cables connected directly to CB terminals will generally not be permitted. Adequately sized cable/busbar adapters shall be provided.

b) Switch-disconnectors

- The switch shall be suitable for the continuous rated duty of the circuit it controls.
- The utilisation category of the switch-disconnector shall be AC23 for motor switching duties, and AC22 for switching of mixed resistive and inductive loads, with an appropriate utilization category (A for frequent switching and B for infrequent switching).
- Rotary switch-disconnectors shall be provided with a 'break-before-make' operation for each pole. The rotary switch, or changeover switch formed by the proprietary interlocked interconnection of two switch-disconnectors or fuse switches, shall incorporate a centre 'off' position.
- Switch-disconnectors for motor starter or variable speed drive duties, that incorporate a test position, shall enable the control circuit supplies while ensuring isolation of the main supply.

c) Fuse switches

- Fuses and fuse bases shall comply with the requirements of SANS 172 and shall be provided with an indicating device to show the "blown" state of the fuse.
- Only Motor circuit fuse links as defined in BS 88 shall be permitted on motor starting circuits.
- Fuse current ratings shall be indicated on engraved 20 x 12 mm white-black-white traffolyte labels in 4 mm figures. The labels are to be fitted at the fuse bases and shall not be obscured by wiring.
- This shall comprise a moulded carriage accommodating either HRC fuses or solid links and shall provide for a switched neutral where required.
- Provision shall be made for the following:
 - Double break contacts on each pole.
 - Arc barriers on each pole.
 - IP2X protection in either state.

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



- Silver plated copper contacts.
 - Neutral link where required.
 - Mechanically operated ON/OFF indicator.
 - Auxiliary switch facility.
 - Full interchangeability of equivalent rated units
- The continuous thermal rating and the circuit fuse rating shall be indicated adjacent to the switch.
 - The minimum utilisation category of the fuse switch shall be AC23 for motor starting duties, and AC22 for power distribution only duties.
 - All fuses used on LV circuits shall be HRC cartridge type fuse links complying with both SANS 60269 and BS 88 Part 6 / BS 88 Part 2 Section 2.2 (fuse links with bolted connections), except as follows:
 - semi-conductor protection fuses recommended or provided by the manufacturer of any power electronics incorporated into the Assembly;
 - sub-distribution fuses for extra-low voltage control circuits in ICA equipment compartments.
 - The sub-distribution fuses for control circuits (mentioned above) shall be miniature ceramic cartridge fuses complying with BS 2950. They shall be mounted in knife-edge ('swinging blade') disconnect type DIN rail mounted terminals. Knife-edge disconnect type terminals shall similarly be used for neutral links.
 - Neutral and earth link holders shall be non-interchangeable with fuse holders, and fuse and link holders shall be segregated according to circuit voltage.
 - Where HRC cartridge type fuse links do not form an integral part of an item of equipment such as an enclosed transformer, a fuse switch, etc., they shall be mounted in all-insulated fuse carriers fitted into fuse holders. An associated neutral circuit shall be provided with a solid copper link, which shall be mounted in an identical manner adjacent to the phase circuit fuse holders.
 - Fuse and link bases shall contain insulating shrouds, that can only be removed using a tool. A fuse or link shall only be capable of insertion into its base using the appropriate carrier. Fuse and link carriers and holders shall be coloured as follows:
 - fuse links: black
 - neutral links: white
 - earth links: green
 - A spare set of all fuse types and ratings used within a functional unit shall be mounted within each functional unit.
 - Combination fuse switches shall comply with SANS 152 and shall be of the independent manual operation type and shall afford minimum protection of IP21.

d) Switch operator

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| Volume | 1 | 2 | 3 | | | |
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- Switch operating mechanisms shall include operators for fuse switches, switch-disconnectors, moulded case circuit breakers and motor protection circuit breakers for Assemblies.
- Switch operating mechanisms shall be door mounted and the switches shall be fixed mounting.
- Switch operating mechanisms shall positively engage with the switch shaft when the door is fully closed and shall be so interlocked with the door so that:
 - It shall not be possible to gain access via a cover or door to any live points unless the switch is in the open position.
 - It shall not be possible to re-close the door or cover unless the switch is in the open position. Operation of the switch with the door open is permissible.
- Clear indication shall be given, both with the access cover or door open or closed, as to whether the switch is in the open or closed position. Colour indication alone will not be acceptable.
- Operating handles shall be pad lockable in the "off" / "open" position. The mechanisms shall accept not less than two padlocks each having a shackle diameter of 6 mm.
- Any isolator mechanism extension shafts shall be provided with guide brackets as necessary to prevent excessive shaft deflection.

e) Contactors, Relays and Timers

- Contactors and relays shall be selected so as to be suitable for the foreseeable operating duty (utilisation category) and operational frequency. They shall operate reliably under reduced voltage conditions by closing (i.e. pulling in and holding) at 85%, and remaining closed at 60%, of the rated coil voltage, and shall be suitable for continuous operation at 110% of the rated coil voltage.
- Contactors shall comply with SANS 60947-4-1 and shall be electro-magnetically operated air-break multi-pole block type construction. They shall readily accept a wide variety and configuration of auxiliary contact blocks, which shall have their terminals protected to IP2X.
- Relays and timers shall be totally enclosed plug-in devices. The bases shall be keyed in order to differentiate between differing relays and timers, and their differing coil / electronics operating voltages, and to prevent incorrect insertion. Bases shall be fitted with retaining clips, and each relay / timer shall have its pin configuration printed on the side of its casing.
- Relay / timer bases shall have screw clamp type terminals protected to IP2X, which shall be accessible with a screwdriver whilst the relay / timer is plugged in.
- Relays shall be provided with a transparent enclosure, visual indication that the relay is in the energised and closed state, and a manual test button.
- Timers shall operate electronically or be synchronously driven and shall be provided with linearly calibrated time interval scales. The smallest indicated time interval shall be 10% (or less) of full scale, with a repeatability of 1% (or better) of full scale. Timers shall be provided with 'energised' and 'timed out' indicators.
- Where timers require to be viewed by operators, they shall be flush front of panel mounted behind a transparent lockable cover.
- Contactors shall be satisfactorily withstand the thermal and dynamic effects arising from the magnitude and duration of through fault currents dictated by the characteristics of the

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



associated protective devices and shall be selected in accordance with the kW/current rating.

- Contactors shall be triple-pole electromechanically operated air-break type, held in or latched pattern as specified.
- Contactors shall be classified as utilisation category AC3 uninterrupted duty for motor starting and as utilisation category AC1 intermittent duty, Class 1, 60% for heater duty.
- Contactors shall be fitted with the required auxiliary contacts. These shall be rated at not less than 6 A and shall be positively driven in both directions.
- Auxiliary relays for control purposes shall be of the multiple pole type and shall preferably possess the feature of field convertible contact configuration.
- Plug-in type relays shall have:
 - Positive-acting mechanical retaining clips. Contact friction alone as a retaining method is unacceptable.
 - A keyed member on plug and socket sides to prevent incorrect insertion.
 - Clear and indelible markings on both the relay and its base indicating the circuit reference in conformity with the associated circuit and connection diagrams.
- Auxiliary time delay relays shall be of electronic or synchronous motor-driven type and the time setting shall be infinitely adjustable over the range of 5–100% of the maximum delay. Timing relays deriving the delay function by thermal or pneumatic means will not be acceptable.
- Auxiliary relays shall have a minimum of 4 individual contacts and shall preferably have the facility to add an extension block with an additional four (4) individual contacts.

f) Control switches and pushbuttons

- Control selector switches shall be of a rotary spring-loaded type, with an AC11 rating, and shall have clearly identified switch positions. Where switches are lockable, the key shall be held captive in the abnormal or over-ride position.
- Pushbuttons shall comply with SANS 60947-5-1 and shall be of a 22 mm diameter, flush bezel type.
- Emergency stop pushbuttons shall be of a mushroom headed push to stop, stay-put and twist-to-release type. Key type release buttons shall not be used.
- Pushbuttons shall be coloured as follows:

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



Table 8: Pushbutton colours

| Function | Colour |
|-----------------|------------------|
| Start | Green |
| Stop | Red |
| Reset | Black |
| Emergency stop | Red |
| Lamp test | Black |
| Close / Down | Green (or black) |
| Open / Up | Green (or white) |
| On | White (or green) |
| Off | Black (or white) |
| Forward | Green (or white) |
| Reverse | Green (or black) |

- Pushbuttons shall be of the one-hole fixing, oil tight pattern.
- Operators (and the mating holes) shall be keyed to prevent rotation of the assembly in the panel.
- Contacts shall be adequately rated for the circuit duty but shall not be less than 10A, 230V AC or 120V DC rating.
- In addition, the operator shall carry an internationally acceptable symbol indicating its function or shall have mounted immediately above it a clear legend of its function or action.
- Operators initiating a motion or circuit closure shall be flush with the surrounding bezel, while operators stopping a function or opening a circuit shall project beyond the bezel.
- Operators providing a selective function e.g. local/remote or auto/manual, shall operate in a semi-rotational manner with equal angular displacement about an imaginary vertical centre line.

g) Indicating lamps

- Indicating lamps shall be suitable for use on either 230V AC or 24V DC control supplies and shall be light emitting diode (LED) type. Lamps suitable for use on 230V AC shall incorporate a step-down transformer. Indicating lamps shall be continuously rated for a voltage of 10% in excess of the rated voltage.
- Lamps shall comprise 22 mm diameter units incorporating either a multi-cluster array of LEDs or a single high intensity surge protected LED; replaceable from the front of panel without any special tools.
- Indicating lamps shall render good visibility under conditions of an ambient illumination level of 400 Lux.
- Lamps shall be provided with one of two indicator lamp colour coding schemes as follows:
 - a primary colour coding scheme, in compliance with IEC 60073, or
 - a secondary colour coding scheme; which although not standard, is required in order to harmonise with existing operational equipment.

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



- Unless detailed otherwise in the Detail Specification, the Assembly shall be provided with indicating lamps coloured in accordance with the primary colour coding scheme, which shall be as follows:

Table 9: Primary colour coding scheme

| Function | Colour |
|--|---------------|
| Dangerous condition | Red |
| Emergency / hazardous condition | Red |
| Emergency stop operated | Yellow |
| Impending critical condition | Yellow |
| Alarm / abnormal condition | Yellow |
| Tripped / fault condition | Yellow |
| Warning | Yellow |
| Normal condition | Green |
| On | Green |
| Running | Green |
| Closed condition | Green |
| Mid position / mid travel | Green + White |
| Open condition | White |
| Available / auto available | White |
| General indication / monitoring | White |
| Mandatory operation required by operator | Blue |

- Where specified in the Detail Specification, the manufacturer shall supply an additional number of loose indicating lamps (or their coloured lenses) of a specified type and coloured in accordance with the primary colour coding scheme and shall retrofit these to specified existing assemblies.
- Where an assembly is provided that incorporates lamp colours in accordance with the secondary colour coding scheme, the manufacturer shall also supply an additional quantity of loose indicating lamps. There shall be a sufficient quantity of the required types and colours; coloured in accordance with the primary colour coding scheme, to permit a third party to retrofit them the Assembly at a later date in order to bring it into compliance with the primary colour coding scheme. In addition, the final drawings for the Assembly shall not detail the colour of any indicating lamp that does not comply with the primary colour coding scheme.

h) Power measuring instruments and current transformers

- The Detail Specification states which functional units shall be provided with power/current and voltage measuring instruments, the type, and the facilities required.
- Display instruments used to indicate voltages and currents shall normally be analogue instruments, shall comply with IEC 60051, be of the low-impedance type and have an accuracy class of 1.5. They shall be flush front of panel mounted with a 90° quadrant minimum scale length, and be DIN96 size for power distribution functional units, and DIN96 or 72 sized for motor starter functional units.
- External zero adjustment shall be possible on all indicating instruments to facilitate adjustment without dismantling the instrument.
- Instruments shall be scaled to 120% of the anticipated designed indication. Ammeters shall be provided with compressed scales to accommodate motor starting or other in-rush currents, and ammeters monitoring motor currents shall be provided with an adjustable red pointer to indicate full load current.
- Meters and relays shall be capable of withstanding, without damage, the secondary currents associated with the maximum available through fault current.

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



- Instruments shall be provided with shrouded connections to their rear, and ammeter circuits with a full-scale deflection in excess of 25 A shall be connected via current transformers (CTs). Apart from CT and ammeter circuits, instrument circuits shall be fused.
- Instruments used in power distribution circuits shall be flush front of panel mounted and shall provide selectable front of panel digital display of at least the following measurements:
 - voltage between phases and between phases and neutral
 - current in each phase
 - power (kW)
 - kVA
 - power factor
 - consumption (kWh)
- They shall provide data output signals for presentation to PLC, SCADA, telemetry, etc.
- Where the Detail Specification indicates that instruments shall provide fieldbus communication with a control system, this shall be via an open protocol compatible with the proposed control system.
- Run hour meters shall be of a 5-digit minimum non-re-settable odometer type, with visual indication of operation, and a minimum resolution of one hour.
- Current transformers (CTs) shall be air insulated, shall comply with SANS 60044, and shall have short circuit ratings in excess of those prevailing at the point of connection. They shall bear individual rating plates, which shall clearly identify the winding polarities (primary or secondary), together with the connection details of any multi-ratio windings.
- Current transformer accuracy classes shall be selected as follows unless otherwise indicated on single-line diagrams:

Table 10: Transformer accuracy classes

| Type of circuit | Class | Comments |
|---|----------|--|
| Indication | 3 or 5 | To match the % accuracy of the instrument |
| Measurement | 0.5 or 1 | To match the % accuracy of the instrument |
| Motor protection | 10P10 | Or as required by protection device manufacturer |
| Power system protection (e.g. IDMTL) | 10P20 | Or as required by protection device manufacturer |
| Power system unit protection (high accuracy; e.g. REF, generation, unit protection) | PX | As specified by protection device manufacturer |

- One pole of the secondary winding of each CT (or group of CTs) shall be connected to earth via a link. All connections to the CT secondary winding shall be made via a proprietary shorting terminal test block. Provision shall be made for attaching test links.
- Current transformers shall be of the low-impedance type and shall, where ratio, class and output requirements permit, preferably be of the ring-type bar-primary design.

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



- Current transformers shall be rated to withstand the thermal and magnetic stress resulting from the maximum available through fault current.
 - Bridging terminals for current transformers shall be provided at the outgoing terminals where external connections are required. In addition, terminal blocks shall be provided to permit secondary injection tests on protective relays.
- i) Control-circuit and auxiliary supply transformers
- Voltage transformers shall be designed, constructed and tested in accordance with the requirements of SANS 60044.
 - Voltage adjustment over the range 95–105% of nominal ratio shall be provided by off-circuit tapplings.
 - Transformers shall be provided with isolating switches on the HV side and with protection on both the HV and LV sides.
 - Voltage transformer primary and secondary windings shall be protected by fuses.
 - The protection on the HV side shall be rated sufficient to withstand inrush currents.
 - Control transformers shall be rated as follows:
 - Sum of sealed-in burden of all contactors, relays, timers and lamps fed from that unit; plus
 - Pickup burden of largest Contactor fed from that unit; plus 10%.
 - The regulation on closing the largest circuit with all the loads except that of the largest load, or if there is more than one, one of the largest loads, imposed on the transformer, shall not exceed 5%.
 - One side of the transformer secondary winding, or the star point thereof, shall be connected to earth via a removable bolted link.
 - Voltage transformer nameplates shall be fixed in a position so that details can easily be read when fitted in the cubicle.
- j) Capacitors
- Capacitors shall be of the non-toxic, dry, self-healing, metallised film type, and comply with SANS 60831.
 - Capacitors shall be fitted with a means of electrical discharge to reduce the residual voltage to less than 60 V within 5 seconds of being switched off.

C3.3.4.2.4.5 E100.4.5 MOTOR STARTER FUNCTIONAL UNITS

- a) General requirements
- Motor starter functional units shall be provided as indicated on the single-line diagrams and as detailed in the Detail Specification, and all equipment, components, and wiring shall be included to achieve the required functionality. The following methods of motor starting shall be considered, where the selection is the Contractor’s responsibility, to provide the required functionality:
 - direct-on-line (DOL)

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- star/delta (open/closed transition to suit application)
 - line reactor
 - auto-transformer (closed transition)
 - soft starters and variable speed drives using power electronics
- Where specified in the Detail Specification, integral direct-on-line starters complying with SANS 60947-6-2, shall be used for motor starters of less than 10 kW. The integral motor starter shall incorporate an isolation device, a short circuit protective device, a contactor and overload protection with Type 2 coordination.
 - Each motor starter shall be provided with an isolation and short circuit protection device.
 - Motor starter contactors, short circuit protective devices, and thermal overloads shall be selected so as to provide Type 2 Co-ordination in accordance with SANS 60439-4-1. The minimum starter contactor utilization category shall be AC3.
 - Motor circuit residual current protection shall only be provided where necessary to discriminate with upstream protection, where the power supply is derived from a TT source, or where specified in the Detail Specification.
 - Contactors used where simultaneous closure would be dangerous, e.g. in reversing, star-delta, or closed transition starters, shall be provided with both mechanical and electrical interlocks.
 - Where components with short time ratings are used, e.g. resistors, transformers, etc., they shall be provided with hardwired temperature monitoring circuits, arranged to trip the line contactor if their thermal limits are reached.
 - Withdrawable starters shall be provided with suitable interlocks to prevent chassis withdrawal or insertion when the starter isolation device is in the “on” position.

b) Functional requirements

- Every individual motor starter unit shall include all equipment, components and wiring necessary to safely and reliably operate the driven plant item. It shall be possible to manually operate plant item from the front panel of its functional unit, notwithstanding any failure or de-selection of any automatic control system, networking / communication facility, PLC, SCADA, or telemetry system. In order to achieve this, the appropriate push buttons / keypads and indicators shall be provided front of panel.
- If the power supply fails whilst a motor is running, the line contactor shall open. On restoration of the power supply, the motor starter shall immediately be made available to re-start the motor without manual attendance or intervention on receipt of a start command (be it initiated manually or automatically). However, where a hardwired automatic control facility is available, a power-on delay timer (adjustable between zero and 60 s) shall be provided in the hardwired circuit.
- Where a 'healthy' signal is required, it shall confirm that the functional unit isolation device is closed, the starter control supply is healthy, no fault condition exists, emergency stop(s) are released, the local isolator (where fitted) is closed. The 'healthy' signal shall be used to provide the 'drive available' input signal to any automatic control schemes or automatic duty selection routines.
- Each functional unit shall provide any automatic control schemes (including auto duty selection routines) with the following status signals as a minimum, as well as all others as specified in the Detail Specification:

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



- Manual/auto mode
 - Running
 - Tripped
 - E/Stop activated
- Each motor starter shall be provided with an emergency stop circuit, which together with its components shall comply with BS EN 418. A field 'twist to reset' emergency stop button shall be provided. On operation of the emergency stop circuit, the motor line contactor shall immediately open, and the emergency stop circuit shall lock out until it is reset. A front of panel 'emergency stop operated' indication lamp and a status signal for PLC monitoring shall be provided. A composite starter may have a common emergency stop circuit controlling all of its constituent drives.
 - Where identified in the Detail Specification, specific process or driven plant interlocks shall be hardwired into the motor starter, and when operated, shall stop and inhibit the drive.
 - Front of panel pushbuttons shall be provided for manual start (forward, and where applicable; reverse), and manual stop. A front of panel control selector switches shall be provided for 'Manual / Off / Auto' or 'Remote / Local' as specified in the Detail Specification.
 - Front of panel indicator lamps shall be provided for 'running' and 'tripped', and an ammeter shall be provided for motor circuits; other front of panel indications e.g. specific fault indication lamps, hours run meter, number of starts counter, etc. shall be as specified in the Detail Specification.

c) Motor protection

- As a minimum, every motor starter circuit shall be provided with a thermal overload unit connected to monitor the current in each energized winding of the motor. Unless otherwise specified in the Detail Specification, motors of over 30 kW shall be provided with electronic overload protection, and motors of over 75 kW shall be provided with electronic motor protection relays. Intelligent multifunction electronic relays shall be provided if specified in the Detail Specification.
- Thermal overloads shall be scaled and adjustable such that the motor rated current is mid-range and shall provide a temperature compensated thermal element for each supply phase to the motor. The unit shall provide single phasing protection and incorporate auxiliary tripping contacts with a manual test facility. The unit shall be capable of being manually or automatically reset (set to auto). Unless otherwise specified in the Detail Specification, thermal overloads shall be trip class 10.
- Electronic overload units shall incorporate the features required of a thermal overload, together with provision for the adjustment of tripping and reset times. In addition, stalled rotor protection shall be provided, together with integral thermistor protection where required. Where required, electronic overloads shall be suitable for use in conjunction with power electronics (soft starters or variable frequency converters).
- Electronic underload protection shall be provided for all centrifugal pump, fan, or directly driven mixer motor circuits above 30 kW. When detecting underload, the device shall measure the true motor power (and not just the phase angle), shall be configured to detect an unloaded running motor condition, and shall incorporate start delay, motor trip, and manual / auto reset (set to auto) facilities. The unit shall incorporate a digital percentage load display.

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- Where required on drives of less than 30 kW, the underload unit shall be provided with overcurrent protection providing the same facilities as a thermal overload. When required on larger drives, underload protection shall be provided as an integral part of an electronic overload or motor protection relay, and where applicable shall be suitable for use in conjunction with power electronics.
- Motor thermistor and RTD (PT100) relays shall be provided for motors which have been specified to be fitted with thermistors or RTDs.
- Motor starter functional units for immersible/submersible pumps shall incorporate all the standard integral motor and pump protection, such as water ingress, temperature of windings and bearings, vibration, etc.
- All protection devices shall operate in a fail-safe manner via electrically maintained relays which de-energise on a fault condition. On sensing a trip condition, the devices and relays shall electrically lock-out the emergency stop circuit and shall be reset manually using a front of panel common fault reset pushbutton. In addition, they shall automatically reset on control supply switch on and upon power restoration in the event of a power loss.
- Electronic motor protection relays and digital overload and underload devices which provide operator interfaces shall have front of panel mounted displays and controls.

d) Test circuits

- The motor starter control circuit supply shall be provided with a functional test facility, whereby the functionality of the control circuit and its equipment and components can be fully demonstrated with the compartment door(s) open, but whilst the motor circuit supply remains isolated at the functional unit isolating device.
- A control selector switch shall be provided for 'Normal/Test' selection inside the relevant compartment
- The test supplies shall be arranged to be de-energised when the motor circuit supplies are energized. The test supply shall be provided with short circuit protection and shall be capable of isolation.

C3.3.4.2.4.6 E100.4.6 BUSBAR AND BUSBAR TRUNKING

- The main distribution circuit through the Assembly shall comprise a main and distribution busbar system, comprising of 3 phase and neutral busbar system. The rated current of the busbar system shall match the rating of the main incomer
- All main and distribution busbars, risers and droppers shall be air-insulated and shall be fabricated from hard drawn, high-conductivity copper. Aluminium busbars will not be permitted. Busbars shall be tinned for wastewater treatment works (WWTW) applications. If pre-tinned copper work is provided, cut surfaces may remain bare, providing the current path is unaffected and suitable contact lubricants are used before tightening joints.
- Main busbars shall be enclosed together within the top of the Assembly. No other conductors shall be run in the busbar compartment. Access to the busbars shall be through covers, requiring the use of a tool for removal. All internal fixings shall be held captive. No components shall be placed in a busbar compartment.
- Main and distribution busbars shall be continuous over each section, extending to over the full length of the Assembly with the same current rating and cross-sectional area throughout their length.
- Main busbars, distribution busbars and all flexible connections, shall be adequately sized, braced and supported to withstand any electromagnetic forces and thermal effects to which

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they may be subjected, including the occurrence of fault currents, up to the full fault levels specified.

- The vertical riser buses shall be copper full height and rated for the section total load. Small openings in the vertical barriers shall permit the plug-on control unit contacts to pass through and engage with the vertical bus bars. Unused plug-on openings in the vertical barriers shall be equipped with plastic snap-in closing plugs.
- All busbar connections shall use joints secured against loosening. Joints and Tee-off connections in busbars shall be made by means of high-tensile bolts, nuts and approved locking washers. A minimum of two such bolts shall be used per joint or tee. The joints shall not be taped in order to facilitate visual inspection and checking of bolt tensions. The joint contact areas shall be smooth, very flat and polished or tinned for dry jointing.
- Busbars shall be provided with phase colour markers, red, white, blue (and black in the case of four wire systems). Such colour identification may take the form of coloured bands at intervals along the busbar run of not more than 800 mm. The combined width of the colour bands per phase shall not be less than 300 mm per 800 mm busbar length. The use of the convention, Red, Rear, Right shall be employed
- The maximum length of any cable connections from a busbar shall be 1000 mm.
- A cabled 'busbar' system of the specified radial or closed ring arrangement may be offered as an alternative to a conventional system if:
 - The Assembly has a rated short-time withstand current or rated conditional short-circuit current not exceeding 10 kA; or
 - The Assembly is protected by current limiting devices having a cut-off current not exceeding 17 kA at their rated breaking capacity.
- This will generally mean that the rated current of such an Assembly will be less than or equal to 100 A.

C3.3.4.2.4.7 E100.4.7 INTERNAL WIRING AND FILLED CONNECTIONS

a) General

- All wiring within the Assembly shall run directly between terminals, without any joints or other connections. Wiring shall be carried out using multi-strand, single-core PVC-insulated copper conductor, 660/1 000 V grade (minimum), to SANS 1507, sized and de-rated where required for the currents to be carried. Single-stranded conductors shall not be used, and no conductor shall be less than 1.5 mm² cross-sectional areas.
- Field wiring connections will be identified by others using the field device tag references. This information will be provided by the Engineer, and the Contractor shall use these field identifiers when identifying the compartment field terminations.
- Wiring layout shall permit alterations to individual circuits without requiring shut down of the complete Assembly.

b) Cable Ways inside Assembly

- All bus wiring and interconnections between compartments within the Assembly shall be contained within the enclosure and shall be segregated in wire-ways separate from other compartments. Where such wiring is terminated in a compartment, it shall be segregated from all other wiring in that compartment. All wiring and cabling entering or leaving a compartment or passing through a partition shall do so via a permanently fixed bush.
- Wiring between components shall be:

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- carried out in a neat and systematic manner
 - contained in non-metallic trunking
 - Run to compartment doors in spiral wrapping.
- Any wire containment system shall securely locate the wiring and provide 25% spare capacity on completion. Cableways shall have furthermore sufficient space to enable the installation and removal of any cable without the need to remove any other cable or component. Cableways shall incorporate adequate facilities to locate and support the cables.
 - Wiring on compartment doors shall be similarly supported and shall be provided with support and protection across the door to compartment side wall transition, whilst permitting the door to be fully opened without straining the wiring. Wiring system accessories shall not deteriorate with heat or propagate flame.
 - Wiring shall be segregated according to need; circuits that enter the compartment without isolation shall be separately segregated and loomed with spiral wrapping and identified. Control circuits shall be wired in twisted pairs or screened cables, and together with data network cabling, shall be physically segregated from power circuits by barriers. If lightning and/or surge protection measures have been used to protect individual circuits, these circuits shall be segregated from the wiring of other unprotected circuits.
 - Cable-ways or chambers shall not contain any equipment or components.
 - Where field cables are terminated other than in the base of the enclosure, cable-ways or cable chambers shall be provided to transport the cables through the enclosure to the compartment or cable box at which they are glanded or terminated. Careful thought should be given to the termination of power cables and their location within the assembly.

c) Gland Plates

- All field cables and wiring shall enter the enclosure through gland plates, which shall be located so as to facilitate the spreading of cable cores.
- Gland plates shall be rigidly supported and maintain the IP rating of the enclosure
- Gland plates and cable boxes shall minimize the effects of eddy currents and be suitable for the type of cable used. Single core cable gland plates shall be made of non-magnetizing material.
- Gland plates for bottom access cabling shall be located at least 300 mm above the finished floor level.
- Each compartment gland plate shall be an integral part of the construction of that compartment

d) Identification

- All wires shall be identified at both ends using colour coded alpha-numeric ferrules. Within a compartment, a wire shall have the same identifier at both ends; and this identifier shall not be duplicated within a functional unit.
- Components and wiring shall be installed such that the identification of every wire is clearly visible and readily accessible on completion of the Assembly installation at site. Horizontal wiring identifiers shall be read left to right, and vertical wiring identifiers shall be read bottom to top.

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- All conductors shall be identified in conformity with the approved circuit and connection diagrams. No number shall be used more than once in each panel except where electrically identical. Wires/conductors shall have the same number on either end of the wire and all wires which are electrically identical shall have the same wire number
- Circuit wiring shall be coloured in accordance with the following:

Table 11: Colour code for wiring

| Wire colour | Function |
|-------------------|--|
| Red (white, blue) | Red (white, blue) phase connections in current and voltage-transformer circuits or connections in red (white, blue) phase power circuits |
| Black | Neutral (star-point) connections whether earthed or unearthed insulated wires |
| Red / black | Connections in AC control circuits (black = neutral) |
| Red / black | Connections in DC control circuits (black = negative) |
| Green and yellow | Earth wires and earthing |

- Power-circuit conductors shall be coloured according to the phase to which they are connected.
- e) Termination
- Wiring shall be terminated using crimped cable ends, lugs or any other approved method that is appropriate for the conductor size and type of termination. All of the strands forming the conductor shall be connected at the point of termination. Soldered connections shall only be used on electronic equipment where it is not practicable to use any other termination method.
 - Wiring with a cross section area of less than or equal to 6 mm² shall be terminated in terminals mounted on DIN rail. Wiring with a cross section area of greater than 6 mm² shall be terminated in bolted terminals.
 - All wiring entering or leaving a compartment shall do so via terminal rails, with the exception of specialised signal or data circuits, which may be cabled directly to dedicated connections on electronic equipment located at the periphery of the component mounting plate.
 - The conductor shall be clamped in such a manner that the captive clamping screw does not come into contact with the conductor. Alternatively, screw-less spring clamp tensioning terminals may be used to terminate single conductors of up to 10 mm². Conductors of cross-section above 16 mm² shall be terminated using stud type terminals; similarly mounted and grouped on DIN rail.
 - No more than two conductors shall be connected to one side of a terminal. Where it is necessary to connect adjacent terminals together, proprietary shorting bars or combs shall be used.
 - Spare cores shall be terminated at both ends or tied back but shall not be cut short.
 - All terminals shall be protected to IP2X, including stud type terminals; which shall be shrouded to achieve this. Terminals shall be segregated according to function and operating voltage; by grouping or by terminal rail mounted partitions or barriers. All stud type terminals shall be provided with individual segregating barriers.
 - All circuit terminal rails shall include 10% spare space.

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- Terminals shall be grouped together and segregated according to operating voltage and function by terminal rail mounted barriers. Stud type terminals shall be provided with individual segregating barriers.
- Terminals shall face the compartment door for ease of connection.
- Terminals shall be located and spaced so as to enable the easy disconnection and reconnection of conductors, whilst providing sufficient space for the looming and spreading of cable cores. Where practicable, the layout of terminal rails shall be such that cores from the same field cable are not split between non-adjacent groups of terminals.
- All wiring of external connections shall be brought out to individual terminals on a readily accessible terminal block.
- All spare contacts are to be wired back to terminals.

C3.3.4.2.4.8 E100.4.8 LOW VOLTAGE EARTHING

a) Main incoming earth terminal

- The Assembly shall incorporate facilities for connecting to the main incoming earth terminal, subject to its location being clearly identified and easily and safely accessible with the Assembly energized. The Assembly earthing system may comprise either an earth bar extending the full length of the Assembly or, for Assemblies with less than or equal to two (2) functional units and a supply rating of less than 100 A, a stud arrangement.
- Earth bars shall:
 - be manufactured from high conductivity copper (tinned for WWTW applications);
 - be located in a safe and easily accessible position;
 - have a minimum number of joints;
 - have at least one disconnecting link;
 - have facilities for connection to the main incoming earth terminal (the Supply Company earthing system and / or from a local earth electrode system) at each end of the bar, and
 - be rated and tested at a minimum of 60% of the busbar fault withstand capacity
 - have a cross-sectional area of not be less than 500 mm², nor less than 50 mm in width.
 - be securely connected in each panel or cubicle to bare metal
- Provision shall be made for the connection for the following connections to the fixed portion of the earth bar:
 - electrical installation main bonding conductors
 - functional earthing conductors external to the Assembly
 - equipotential bonding conductors external to the Assembly
 - other equipment protective conductors external to the Assembly
 - the Assembly main earth bar / circuit, which shall be terminated onto the fixed portion

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- an additional 2 No. spare terminations

- All metallic non-current carrying parts of the Assembly shall be bonded together and connected to the Assembly earth busbar.

b) **Compartment earthing**

- Each compartment shall include an earth stud connected to the main earth bar or stud by separate connections or by a common vertical earth tape. Earth conductors to each compartment shall be sized to withstand the fault level, subject to a minimum cross-sectional area of 6 mm².
- The following shall be directly connected to the compartment earthing terminal by earthing conductors with a minimum cross sectional of 4 mm² or braided straps of similar rating:
 - compartment door
 - any removable cover
 - component / equipment mounting rails and earth terminals
- A compartment may contain subsidiary earth terminals or bars to which the following circuits may be specifically connected:
 - ‘clean’ earths from instrumentation circuits and equipment
 - functional earths; e.g. from telecommunications equipment
 - surge protection earths; e.g. direct connections from lightning protection units
- These earth terminals or bars shall be separately connected directly back to the Assembly main earth bar with 6 mm² minimum cross-section conductor.
- Cable gland plates associated with a compartment shall be provided with an earth stud, which shall be connected directly to either the compartment earthing terminal, or to the main earth bar, with a conductor of 6 mm² minimum cross-sectional area.
- Doors having components mounted on them shall be bonded to the main structure by means of flexible copper earth connection arranged so that it cannot be trapped as the door is opened or closed. Metal hinges shall not be considered sufficient to ensure electrical continuity.
- Where cables carry low level high frequency signals, or are installed where there is a significant risk of high frequency interference; (e.g. in signal circuits connected to equipment containing power electronics), they shall where necessary have their screens / braids capacitively connected to earth in a proprietary manner, and proprietary means shall be included to provide 360° earthing for field cable braids / screens.

c) **Intrinsically safe circuit earthing**

- If specified on the Detail Specification, separate earth bars or studs shall be provided for connecting equipment requiring a clean earth or an intrinsically safe earth directly to the main incoming earth terminal. If required, such earth bars or studs shall be located adjacent to the equipment requiring a clean earth or an intrinsically safe earth, as appropriate.
- Where Zener diode safety barriers are contained within a compartment, they shall be separately and directly connected to the main earth bar via duplicate earthing conductors;

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each of 6 mm² minimum cross-section. These conductors shall be clearly identified as intrinsically safe earths.

C3.3.4.2.4.9 E100.4.9 POWER FACTOR CORRECTION

a) General requirements

- Power factor correction capacitors shall be so selected and sized as to raise the lagging power factor due to induction motor loads; either individually or when summated across the Assembly, to a final corrected power factor of 0.98 lagging. When designing the system, the un-corrected power factor for each motor shall be taken as that quoted in manufacturers' literature for a high efficiency motor of equivalent rating operating continuously at its 75% duty point.
- Capacitors shall be of the non-toxic self-healing dry metallised film type. Every capacitor or group of capacitors shall be provided with integral discharge resistors to reduce the residual terminal voltage to less than 50 V within one minute of being disconnected from the supply.
- Capacitors shall be suitable for continuous connection to a three-phase low voltage industrial power supply. If the low voltage power system to which the Assembly will be connected has significant voltage waveform distortion or harmonic content or has other capacitive or inductive networks (e.g. harmonic filters) connected to it, additional information must be obtained by the Contractor via site surveys.

b) Power factor correction for individual drives

- Where power electronic soft starters are used, the sequence of the connection and de-energizing of the capacitors shall be in accordance with the manufacturer's recommendations. Power factor correction shall not be applied to variable speed drive systems.

c) Bulk power factor correction

- Where detailed in the Detail Specification, bulk power factor correction shall be provided for the whole Assembly, in a purpose designed functional unit occupying one or more compartments within the enclosure.
- Capacitors shall be arranged into banks, suitably sized to enable the incremental control of the power factor against a changing load. Each bank shall be automatically contactor controlled, in a manner that minimises switching surges, and capacitor bank status information shall be derived from the contactor auxiliary contacts. A proprietary multi-stage power factor controller, with a minimum of six steps, shall be used to monitor and sequence the switching of the capacitor banks.
- Where there is provision to supply the Assembly from a generator, automatic means shall be included that will inhibit bulk power factor correction when the generator is in use.

C3.3.4.2.4.10 E100.4.10 POWER FACTOR CORRECTION

a) Soft starting equipment

- 10Soft starters shall comprise a proprietary item of chassis mounted equipment, designed for installation within an Assembly. They shall be rated to continuously carry the intended motor full load current and provide the required number of starts per hour.
- The soft starter shall be thermally designed to carry the motor current until the motor protection operates, and where this cannot be guaranteed, high speed semiconductor fuses shall be provided to protect the power electronics. Where such fuses are used, a spare set shall be provided and fixed within the compartment.

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- Soft starters shall be of a digital energy optimising design and shall incorporate appropriate motor protection, and where pumping circuits are being controlled, soft stop features shall be included. When the soft starter has completed the ramped application of motor voltage, a 'top of ramp' signal shall be generated.
- Soft starters shall incorporate a built-in by-pass contactor rated for the full load running current of the motor, such that on receipt of the 'top of ramp' signal, the by-pass contactor shall close and divert the motor current away from the power electronics. When running in the by-passed condition, the motor shall continue to be provided with the full protection and monitoring features afforded by the motor starter. When a controlled stop command is received, the by-pass contactor shall be de-energised, in such a manner that the control of the motor is transferred to the power electronics.
- Facilities shall be provided for the emergency stopping of the controlled motor in the shortest possible time. The emergency stop facility shall not be dependent on any software functions within the soft starter or its associated equipment and shall disconnect the soft starter from the supply by means of a full load rated line contactor fitted between the compartment isolation / protective device and the soft starter.
- Where specified in the Detail Specification, connectivity between the soft starter functional unit and other equipment or systems within the Assembly shall be via an open field device network compatible with the proposed PLC control system. It shall preferably use an interface device integrated within the soft starter, so as to provide remote network access to the full range of the soft starter's control and monitoring facilities.

b) Variable speed drives (VSDs): General

- The VSD motor starter shall comprise a variable frequency converter (VFC), phase shift transformer(s) (where required), and all other components necessary to provide the full speed and torque control of an a.c. cage induction motor over the specified operating speed range up to the
- VFCs shall either be wall-mounted, housed within a motor control centre or free-standing units within their own enclosures as specified in the Detail Specification.
- Unless otherwise specified in the Detail Specification, VFCs shall have uncontrolled rectifiers (i.e. diode front-end) with the specified pulse number (6/12/18). Either a.c. line reactors or d.c. link chokes shall be provided with all 6-pulse VFCs to reduce input current harmonics.
- Where a phase shift transformer is required to achieve the specified rectifier pulse number, the transformer shall be provided as an integral component of the VSD and, unless otherwise specified in the Detail Specification, shall be of the dry type and housed in a dedicated section of the VFC enclosure.
- VFCs shall be capable of operating under the service conditions specified in Clause 4 of SANS 61800 Part 2, and any unusual environmental service conditions specified in the Detail Specification. Functional features and performance requirements shall be in accordance with Clauses 3 and 6 of SANS 61800 Part 2 respectively as varied
- The output rating of the VFCs shall be selected to suit the associated motor and shall take into account the operating speed range.
- Every VSD motor starter shall be provided with incoming supply isolation and short circuit protection as well as an input contactor if specified in the Detail Specification.
- The VSD shall provide the specified motor protection either as an integral part of the VFC or by way of a separate motor protection relay.

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- c) Where any semiconductor or special d.c. circuit fuses are used in the VFC power circuit, a spare set shall be provided. A list of all fuses, type, ordering code and supplier and supplier details shall also accompany the spare fuses.
 - The VSD control system shall incorporate comprehensive diagnostics to provide fault supervision and status indication in accordance with Clauses 3.2 and 3.3 respectively of SANS 61800 Part 2 and any additional requirements specified in the Detail Specification.
 - Input/output devices and communication links shall be provided as specified in the Detail Specification.
 - The Contractor shall ensure that the suppliers of the VFC and the associated motors confirm that their standard equipment is fully compatible and, if not, that the necessary equipment design changes (e.g. enhanced motor insulation) and/or supplementary equipment (output filters or reactors) is provided to ensure compatibility.
 - The Assembly shall permit adequate heat rejection from the VSD compartments and the Contractor shall provide estimates of the total heat rejection from the Assembly. The location of the Assembly and VSD panels, and the ventilation arrangement, shall be as specified in the Detail Specification.

- d) Variable Speed Drives (VSDs): EMC Requirements
 - All VSDS shall comply with the requirements of product standard SANS 61800-3 for Category C2/C3 as appropriate and an EMC filter shall be provided as part of a VFC if necessary, to achieve the required electromagnetic compatibility.
 - The supply voltage distortion limits specified in the Detail Specification shall be achieved through the use of diode front-end VFCs with higher pulse numbers, active front-end VFCs or harmonic filters. Documentary proof shall be provided with the Tender that the VFC input current harmonics will be limited to the required levels.
 - When specified in the Detail Specification, the Contractor shall carry out a harmonic survey at the point of supply to measure background voltage harmonics. The Contractor shall repeat the survey after the commissioning of all VSDs to demonstrate that the actual harmonic performance of the VSDs under worst case operating conditions does not exceed the specified limits.
 - Any VFC input harmonic filters or line reactors and any output filters (i.e. dU/dT, common mode or sine filters) or reactors shall be provided as part of the VFC and shall be included in the supply price. Output filters shall be provided where required to ensure motor insulation compatibility and/or control of bearing currents. Output reactors shall be provided if motor supply cables exceed the allowable length.
 - The design of dedicated VFC input harmonic filters shall take account of the supply impedance provided in the Detail Specification, any background voltage harmonics, any other reactances (e.g. transformers) or capacitors (e.g. power factor correction), or other filters connected to the power system, so as to avoid possible resonance problems.

- e) Variable Speed Drives (VSDs): Control
 - The VSD control panel / operator interface shall be mounted in the face of the VSD panel/ Assembly. Control parameter adjustment shall be easily achievable by menu-driven option selections, with engineering options protected from unauthorized changes by the use of multi-level password protection.
 - All operator controls and indications shall be available front of panel, either via an operator interface / keypad, or by using discrete pushbuttons and lamps, etc.
 - The VFC shall incorporate on-board protection, control and monitoring features, which shall include, as a minimum, the following:

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- On
 - Unit Ready
 - Overload
 - Failure
 - Current limit
 - Over voltage
 - Manual start and stop
 - Raise and lower speed
 - Current operating status
 - Speed indication
- The VSD shall be such that when set in the 'manual' mode, operation from the control panel / operator interface shall be as follows:
 - a start command shall cause a normal ramped start up to the pre-set speed
 - a stop command shall cause a normal ramped down stop and shutdown of the drive
 - All diagnostic and fault messages shall be stored, whether reset or not and it shall be possible to recall them from the operator interface/control panel.
 - All VFC function parameters shall be programmable from a dedicated keypad, or via a standard programming software package installed on a standard portable notebook. A serial communications port to RS232 / RS485 standard or other network communication port shall be provided for dedicated communication with the VFC, and via which all programmable, control, monitoring and diagnostic functions available locally at the VFC shall be accessible
 - A copy of the configuration /standard programming software shall be provided with each VSD.

C3.3.4.2.4.11 E100.4.11 CONTROL CIRCUIT SUPPLIES

- a) Provision of control circuit supplies
 - Fixed pattern functional units shall incorporate individual control circuit supplies that are derived from within the functional unit.
 - Control circuit supplies shall be 230V AC (single pole and neutral) or 24V DC as specified in the Detail Specification. They shall be separately derived from double wound transformers, which where practicable shall have 400V primary windings. Double pole primary winding protection shall be provided by fuses or a miniature circuit breaker.
 - The rating of each control transformer shall exceed the sum of the foreseeable maximum continuous load (which for an electromagnetic device shall be the 'hold-in' VA) plus the in-rush.

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- Control circuit supplies shall comply with SANS 60204-1, and the neutral terminal of each transformer secondary winding shall be provided with a removable link and shall be connected to earth. Secondary winding overcurrent protection shall be provided.

b) Control circuit features

- One pole of every contactor and auxiliary relay coil, timer, etc. shall be connected directly to the neutral (i.e. earthed) side of the control supply. Each control circuit shall be sectionalized and arranged such that where practicable, discrimination is achieved under fault conditions.
- Where possible, common controls and ICA compartment circuits shall operate at 24V DC and shall interface with the functional unit 230V AC control circuits by means of 24V DC interposing relay(s) located in the functional units.

C3.3.4.2.4.12 E100.4.12 SIGNS AND LABELS

a) General

- Safety signs and labels shall be provided wherever necessary in relevant languages so as to unambiguously communicate safety and functional guidance to any person who may operate the Assembly or otherwise come into contact with any part of the electrical system forming a part of the Assembly, and shall be provided for the specific identification of every component contained within the Assembly.
- Signs and labels shall be located in such a manner that:
 - it is obvious as to the nature and location of the hazards or component(s) to which they relate
 - when mounted on any enclosure cover or plate, there is no possibility of that cover or plate being interchanged with any similar item on that Assembly or on any other Assembly supplied to the same site
 - they are not fixed to easily removable parts (e.g. trunking covers, etc.), unless their purpose is to warn of the consequences of removing a removable part
 - they are at all times adjacent to the item to which they refer, and accommodate situations where components could be moved along a DIN mounting rail
 - they will not be obscured by any equipment, components, or wiring, etc.
 - they are legible and will remain easily read throughout the life of the Assembly
 - Signs and labels shall be securely and permanently fixed using an appropriate number of corrosion resistant, mechanical fixings. The fixing of labels, safety signs and notices shall not affect the IP rating of the Assembly.
- Short individually fixed labels covering several items only, shall be used in lieu of long multi-legend labels; e.g. above a row of indicator lamps.
- Self-adhesive, vinyl safety signs may be used if there is no requirement for special legend and propriety safety signs are available.
- Safety signs and labels shall be of such size that the legend thereon is clearly legible from the operating position (or a 3m distance), and the pictograph and its accompanying text shall be chosen so as to provide the appropriate communication in an explicit and unambiguous manner.

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- Safety signs and labels fixed to the outside of the enclosure shall be manufactured from 1.5mm thick anti-reflective polycarbonate with the legend reverse screen printed, or alternatively from 3mm thick bevel-edged clear Perspex rear engraved with black characters. Internal labels may be manufactured from a laminated plastic material which shall normally provide a black legend against a white background. Where specifically agreed with the Engineer, internally mounted labels and charts, e.g. for distribution boards, etc., may be of permanently printed plastic, plastic laminated thin card, or thin card protected behind Perspex.

b) Safety Signs

- As a minimum, safety signs shall be fitted to removable covers over busbars and live connections, and to doors of compartments containing:
 - incoming supply cable termination points
 - internal switching and isolation devices
 - incoming or internal means of isolation; stating the highest voltage controlled by the means of isolation
 - functional units incorporating capacitors
 - more than one supply or multiple control circuits originating elsewhere
 - equipment located in a ‘safe area’ but associated with certified apparatus located in a hazardous area; a sign shall also be fitted at the safe area cable termination rail.
- A safety sign identifying the operating voltage shall be placed in any compartment where there is equipment, components, or wiring, that can be energized at above extra low voltage.
- Where there is no suitable standard symbol or pictograph, an application specific sign may be produced using simple and appropriate symbols, pictographs, and text, to indicate the hazard in a simple and straight forward manner that is acceptable to the Engineer.
- Multipurpose signs shall be used where there is a need to communicate multiple hazard messages.

c) Labelling

- The text of every label, excluding individual internal component identification labels, shall be as agreed with the Engineer.
- Every Assembly shall be provided with a name plate detailing the following:
 - Manufacturer’s name or trademark
 - Manufacturer’s contact details
 - Manufacturer’s type designation, serial / identification number
 - Date of manufacture
 - Rated operational voltages, frequencies, and number of phases
 - Continuous busbar rating

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- Short circuit withstand current and duration
 - Cascading label
 - IP rating
- An application name shall be prominently displayed on the Assembly, as detailed in the Particular Specification.
 - Each compartment shall be identified with a designation label which shall include the full plant functional name and the alpha numeric tag-number, kW rating, full load amp rating. For rear access Assemblies, a duplicate designation label, mounted adjacent to the gland box, shall also be provided at the rear of each compartment.
 - The material used shall be selected having regard to the size and fixing methods of the label and the label shall not warp in service. Labels mounted on the outside of the Assembly shall be rectangular in form and be manufactured of either:
 - Laminated plastic, engraved so as to produce black letters on a white background
 - Engraved sandwich board ("Trifoliate", "Darvic" or equal)
 - Reverse engraved acrylic material ("Perspex") with filled letters and reverse sprayed
 - For outdoor applications (where specified) labels shall be brass or aluminium (with letters filled in black), lightly sanded with fine grit paper and clear lacquered
 - Labels for door mounted components and labels used inside the Assembly shall be to the same standard or may alternatively be printed using an approved, propriety system.
 - Text characters shall be uniform in height, in upper case (except where standard abbreviations of units are used, e.g. kWh, kVA, etc.) and of the following minimum dimensions:
 - application labels: 8mm
 - compartment designation labels: 6mm
 - information or warning labels: 6mm
 - component identification labels: 3mm
 - All components shall be clearly labelled. Internal components shall be clearly identified by individual labels to indicate the equipment to which they relate. The component identification labels shall correlate with the Assembly drawings and documentation. If this is not practical due to space restrictions, common labels (e.g. diagrams may be used).
 - Current transformers shall be provided with separate and individual identification and rating plates.
 - Each distribution board shall be provided with a circuit chart laid out in a way that matches the orientation and layout of the protective devices in the distribution board.
 - A typed circuit chart shall be permanently fixed inside each Assembly or immediately adjacent to the distribution board. The chart shall be laid out in accordance with the physical arrangement of the protective devices that it is easy to relate the circuit chart details to the appropriate protective device. As a minimum, the chart shall be enclosed in a transparent protective cover attached to the inside of the compartment door.

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C3.3.4.2.4.13 E100.4.13 INSTALLATION REQUIREMENTS

a) Shipping

- Assemblies shall be shipped in sections to facilitate field handling for transportation and installation. The shipped sections shall be joined together to form a complete unit assembly.
- Preparation for shipment shall protect the Assembly auxiliary devices accessories, etc. against corrosion, breakage or vibration injury during transportation and handling.
- Disassembly shall be into the largest components or sub-assemblies possible, consistent with packing, road transport and handling limitations.
- All parts shall be clearly and lastingly match marked to facilitate field erection prior to disassembly and packing for transport. Instructions shall be provided for reassembly of sections in the field or accompanied by a qualified representative from the Assembly Manufacturer.
- The Contractor shall be responsible for delivery including loading and unloading of all equipment to site.
- The Contractor shall provide information (in time) regarding specialised handling and storage requirements/techniques for equipment on the site until finally installed in the operating location.

C3.3.4.2.4.14 E100.4.14 LOCAL CONTROL PANELS

a) General requirements

- The START/STOP pushbutton or control station shall be mounted adjacent to the drive.
- The enclosure incorporating the pushbuttons, selector switches and indicating lights shall be fully water, weather and vermin-proof and shall have a minimum rating of IP65. The enclosure shall be manufactured from 3CR12 and shall be painted B26 to SANS 1091.
- All pushbutton control station shall be pedestal mounted on a bracket at least 1 000 mm above ground/floor level.
- All START pushbuttons shall be green and the operator shall be flush with the surrounding bezel.
- All STOP pushbuttons shall be a red mushroom head latching push button and shall serve as an emergency stop.
- All selector switches shall be rotary selector switches with black operators.
- The control/pushbutton station shall be adequately designed to provide space for the following:
 - The required pushbuttons, selector switches and indicating lights complete with their appropriate labels.
 - Termination of all control wiring associated with the drive or group of drives. The minimum terminal strip length is 150 mm. A single multicore control cable shall be installed from the Assembly to the station, from where the required signals will be individually wired.

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- Stations for submersible equipment shall in addition of the required control cables, also provide for the termination of all the required power cables.
- Sufficient space shall be provided for the glanding of the required cables.
- All further requirements pertaining to the design, construction, installation and commissioning of control panels (e.g. Labelling, earthing, commissioning, etc.) shall be as specified in the relevant subsections of this Specification.
- Start/Stop pushbutton stations
- In addition to the above general requirements, START/STOP pushbutton station shall confirm to the following additional requirement:
 - One START pushbutton
 - One STOP pushbutton, The STOP pushbutton shall be twist to release.
 - Where reverse local control is required the reverse button shall not latch unless required.

C3.3.4.2.4.15 E100.4.15 FUNCTIONAL DESIGN

a) Specification to the Contractor

The Engineer shall provide the Contractor with the following information, which will form the basis for the design of the Assembly:

- The Particular Specification
- The Detail Specification will detail all project specific requirements.
- MCC and Local Control Table
- The MCC and Local Control Table will be a schedule of all external connections and their function, ratings, etc. It gives an indication of each load's kW rating and the relevant circuit breaker size that must be selected. Also stated will be the type of starting, the local visual indication and the requirements for manual, automatic and local control needed.
- I/O Schedule
- The I/O Schedule will detail all the input and output signals (analogue and digital) for the controller connections, and the relevant equipment part it connects to.
- Technical Data Sheets
- The Technical Data Sheets are intended for use as standard templates, which will be completed and inserted into the Detail Specification documents, so as to detail the project and product specific requirements for each Assembly as a whole, and for its constituent functional units.
- Project specific configuration of the Technical Data Sheets will take the form of a 'YES' 'NO', insertion of a value or, together with the provision of an associated Particular Specification clause, cross-reference, or stated requirement, etc., as appropriate. When compiling a Detail Specification document, only those Technical Data Sheets applicable to the required functional units will be included.

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- One set of Technical Data Sheets will be prepared per Assembly, unless therein detailed otherwise. Individual Technical Data Sheets may be duplicated if applicable, in order to accommodate the extent of scheme specific information.
- Control Philosophy
- The Control Philosophy will detail the functionality of all control and automation systems.
- Cable Block Diagram
- The cable block diagram is a schematic that shows how the components of the Assembly is connected to the equipment and motors that it controls. It also indicates starting method, cable and circuit breaker sizes.
- Assembly general arrangement drawing
- A proposed layout shall be provided for the Contractor as indication of the relevant size constraints for the Assembly. It shall also indicate the number of functional units (e.g. motor starters, feeders, etc.) that is required for the Assembly.
- Building arrangement drawing
- A drawing indicating the Switchgear-room layout shall be used for functional considerations of the Assembly design. This drawing could be provided under the civil part of the project.

C3.3.4.2.4.16 E100.4.16 TESTING AND COMMISSIONING

a) General requirements for testing

- On completion of manufacture, the Assembly shall be subjected to a factory acceptance test (FAT), comprising the Manufacturer’s in-house tests, and the repeat tests witnessed by the Client and the Engineer.
- Once the witnessed FAT has been carried out, signed off, and any remedial works have been completed and re-tested, the Assembly is ready for delivery to site. Once erected in position, the Assembly shall be subjected to a witnessed site acceptance test (SAT).
- Once the SAT has been carried out and signed off, any remedial works shall be completed and re-tested. Plant installation and site cabling will then be carried out by others, and on its completion, witnessed commissioning shall commence.
- The manufacturer shall allow for each test (apart from in-house tests) to be witnessed by both the Client and the Engineers simultaneously. An individual testing activity shall not be considered to have been completed until any results have been recorded, and it has been signed off by the Engineer.
- The manufacturer shall provide the Client and Engineers with all reasonable facilities, including testing staff and test equipment, to carry out the inspections and tests, and to check the Assembly for compliance with all of the Client’s requirements.
- The manufacturer shall ensure that all testing is carried out in a safe manner and shall protect those witnessing from danger; in accordance with the Occupational Health and Safety Act.
- In order to demonstrate the functionality of each circuit, external devices shall be simulated in a representative manner. A small motor shall be used as a test load where motor starters incorporate power electronics. During development, software may be electronically verified away from the Assembly using a simulation / diagnostic package; notwithstanding this, control systems shall be witnessed tested with the software loaded into the programmable devices, and with simulation of the physical I/O devices.

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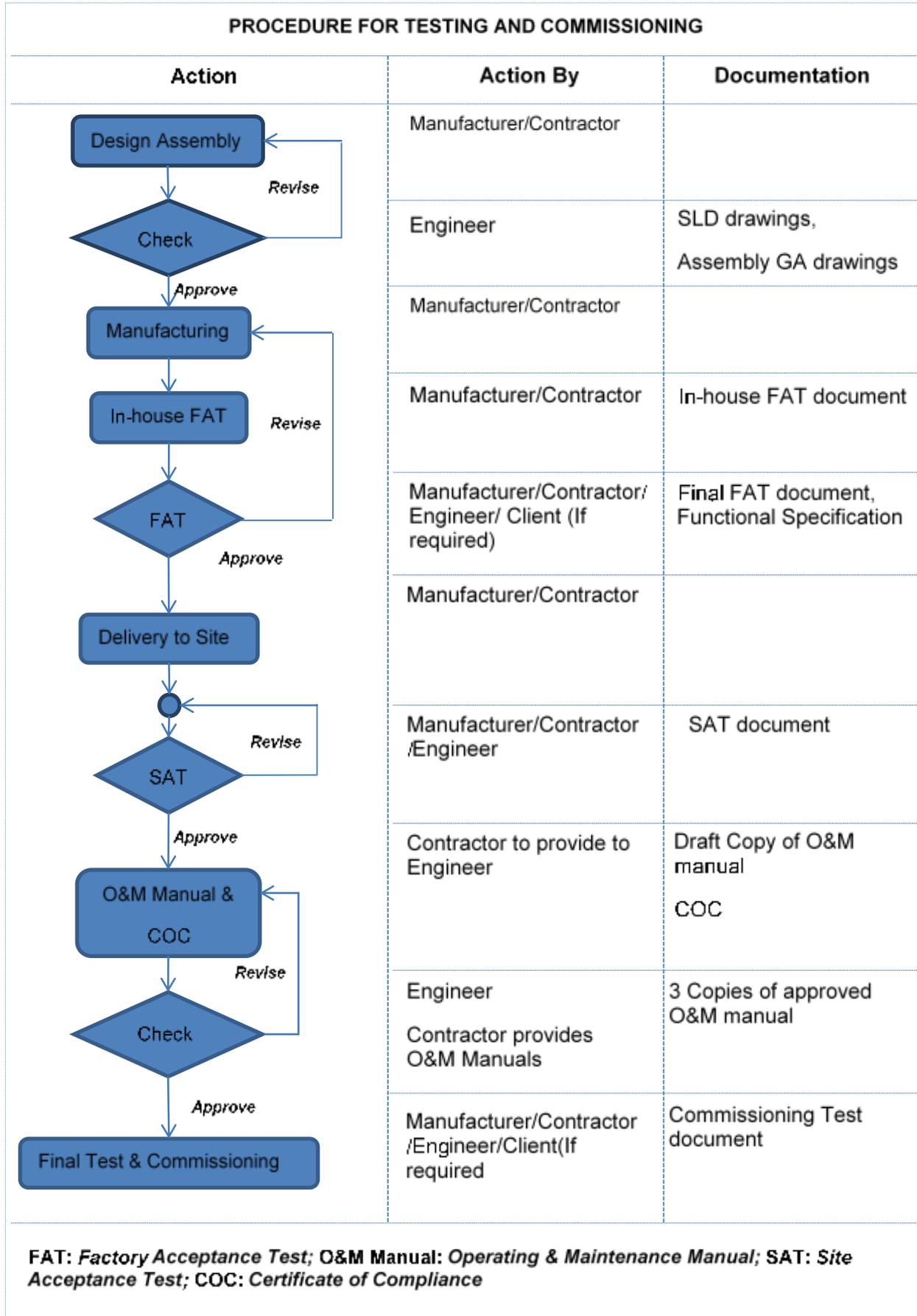
RENOVATIONS AT NORTHERN WORKS LABORATORY
AND FLOW LABORATORY
Particular Specifications



- Where the Assembly incorporates equipment requiring special testing facilities or procedures, the manufacturer shall ensure that appropriate resources are available; including where necessary, representatives from the equipment Manufacturer.

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b) Factory acceptance tests (FATs)

- The manufacturer shall perform his in-house works tests in accordance with the proposed FAT procedures and shall satisfy himself as to the accuracy and quality of the manufactured Assembly in accordance with the accepted design. Once the in-house FAT has been carried out, signed off by the manufacturer, and any remedial works have been completed and re-tested, the tests shall be repeated and witnessed by the Client (if required) and the Engineer.
- The in-house and the witnessed FATs shall check compliance with SANS 60439-1, and shall include the following:
 - A thorough external and internal visual inspection.
 - Confirmation of adequate earthing.
 - Secondary injection testing of all protective circuits shall be carried out, except where discrete current transformers are used; in which case sufficient primary injection testing shall be carried out to prove the ratio and the polarity.
 - Meggar tests shall be performed across all main and distribution busbar joints.
 - All busbars shall be subjected to a single witnessed reduced voltage dielectric ‘flash’ test; the in-house test shall also be at a reduced voltage.
 - All power circuits shall be subjected to insulation resistance tests.
 - The operation of every mechanical device and interlock shall be verified.
 - All circuits and their functionality shall be tested as detailed in the Control Philosophy and MCC and Local Control Table.
 - Any other test necessary to verify satisfaction with the requirements of Table 7 of SANS 60439-1.
- When testing the performance of any software, it shall be demonstrated using the hardware intended to be incorporated within the Assembly, and where this is not possible appropriate operator interfaces, programming units, and terminal units, etc. shall be provided. Where it is necessary to demonstrate an interface with a piece of unavailable equipment to be supplied by others, appropriate means to replicate that equipment and simulate the interface shall be provided.
- The Engineer preserves the right to cancel and postpone tests if he finds that the Contractor has not made reasonably sure that the test will be successful. Any extra costs incurred shall be borne by the Contractor.

c) Site acceptance test (SAT)

- All equipment and every circuit that was altered or disturbed subsequent to the completion of the FAT, or for shipping and site erection, shall be specifically re-tested for integrity and functionality.
- During the SAT, all busbar joints that are re-tightened on site shall be subjected to a further Meggar test, and all busbars shall be subjected to a single witnessed full voltage dielectric ‘flash’ test.

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- The process functionality of each aspect of the control system and its operator interface shall be demonstrated, including the correct operation of all I/O and network links external to the Assembly or not otherwise tested during the FAT.
- A COC shall be provided to the Engineer, before final Testing and Commissioning can start.

d) Commissioning and other tests

- The manufacturer shall provide attendance during the commissioning of the Assembly, whereby the functionality of the Assembly and its control system and software shall be proven. During commissioning the manufacturer shall make such adjustments, software modifications, and circuit changes, as are deemed necessary to provide the level of plant functionality and performance specified by the Client. All such changes shall be immediately incorporated into the 'as installed and tested' documentation and the Operating and Maintenance Manual, by the Contractor.
- The manufacturer shall provide an acceptance document, to detail and record the tests and their anticipated results, and the acceptance document shall have provision for recording and signing off the results.

C3.3.4.2.4.17 E100.4.17 DOCUMENTATION AND TRAINING

a) General

- All drawings, information, and documentation shall be in English, and each item shall be identified with:
 - the Client's name and contact details
 - Client's project / scheme / contract reference title and numbers
 - the Engineer's name and contact details
 - Engineers reference numbers
 - Contractor's works / contract / order references.
- Drawings for acceptance shall be provided on A4 or A3 paper copies as specified.

b) Drawings for Approval by the Engineer

- The following documentation and drawings shall be submitted to the engineer prior to the procurement or manufacturing of Assemblies and related equipment:
 - Cable block diagrams.
 - General arrangement and elevation drawings, compartment door layouts, typical component mounting plate layouts, and foundation plans.
 - Electrical schematic diagrams showing all equipment and components incorporated into the Assembly. Known circuitry outside of the Assembly and connected to it, shall be shown on all drawings. Drawings shall be cross-referenced using a grid / line reference system.
 - Protective device grading for overcurrent, short circuit, and earth fault / leakage devices incorporated within the Assembly, together with a schedule of proposed settings that will ensure discrimination.

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- PLC software and configuration documentation; including ladder logic diagrams and HMI display screens, etc. The documentation shall be complete and annotated with purpose, function, duty, cross-references, and descriptions, etc.; sufficient to guide an unfamiliar person through the operation of the software.

c) Testing Documentation and Reports

- The FAT and SAT shall be according to BS EN 62381.
- A factory acceptance test (FAT) document shall be provided to the Engineer prior to the witnessed FAT. This documentation shall show the manufacturer’s in-house test procedures and results for all items of equipment, components, hardware, and software. The document shall show hardware checks, the software simulation procedures, and their combined functional testing. It shall comprehensively and clearly show the test results of the in-house testing. The subsequent report of the FAT witnessed by the Engineer shall be appended to this documentation.
- The Contractor shall provide his own testing report template to document the FAT witnessed by the Engineer. This shall be to the satisfaction of the Engineer.
- A site acceptance test (SAT) document shall be produced, which shall detail all tests necessary to demonstrate the functionality of the Assembly following its final erection on site. This shall include details of tests and checks on all circuits disconnected for shipping, together with any equipment, components, wiring, or software altered or incorporated into the Assembly; following the completion of the witnessed FATs.
- All drawings, schedules, listings, and other design documentation for acceptance shall be supplied as a comprehensive and integrated package and collated into folders; unless otherwise agreed with the Engineer. Three copies of appropriate documentation shall be submitted on each occasion that agreement is sought.
- A Certificate of Compliance (COC) shall be provided for all new Assemblies. For all refurbished Assemblies, a letter shall be provided listing all the repairs and stating that the Assemblies are still deemed to be reasonably safe.
- The FAT, SAT, and COC shall each have been submitted and agreed with the Engineer, prior to the commencement of final testing and site commissioning.

d) Certificate of Compliance

- A Certificate of Compliance (COC) shall be provided for all new Assemblies. For all refurbished Assemblies, a letter shall be provided listing all the repairs and stating that the Assemblies are still deemed to be safe.
- The original COC shall go to the client’s electrical representative.
- A copy of the COC shall be included in the O&M Manual.

e) Operating and Maintenance Manual

- One copy of the draft operating and maintenance manual and spare parts list shall be provided at an agreed date; in advance of the date of the start of the final testing and commissioning SATs, for acceptance by the Engineer. Three copies of the final editions shall be provided to the Engineer by an agreed date before successful completion of final testing and commissioning.
- The Operating and Maintenance Manual shall be bound into a suite of hard-backed ring binders and shall be provided with an index of all drawings pertinent to the Assembly. The

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index shall include each drawing's origin, number, issue, status, and the Client's drawing number (where issued by the Engineer).

- The Operating and Maintenance Manual shall include the following:
 - All design drawings and documentation relating to the Assembly; as delivered and tested.
 - 'As installed and tested' records showing verification against stated design and installation criteria, including a schedule of all the final settings for all user adjustable equipment and components, and copies of all documentation presented and completed during the FATs, the SATs, and any other specified tests on completion.
 - Schedules of plant and equipment for each compartment / circuit; including a listing of the applicable standards, manufacturer, settings, type number, re-order code, etc., for each item of equipment and component included within the Assembly.
 - Manufacturers' contact details, technical information sheets for all items of equipment and components included within the Assembly. Manufacturers' catalogues may be provided subject to clear identification of the relevant components. All individual manufacturers' equipment / component test certificates and certificates of conformity shall be included.
 - Inspection, testing, and maintenance recommendations, including detailed and specific operation, maintenance, and diagnostic data, and safe isolation information suitable for use by maintenance personnel, shall be provided for all equipment, components, and systems incorporated into the Assembly.
 - Schedule of spares provided with the Assembly, including manufacturer, description, part number, order code, and quantity.

- The Operating and Maintenance Manual shall include detailed descriptions for use by the Client, on how the controlled plant and its management systems are intended to operate and be operated; under both manual and automatic control. Clear and detailed descriptions for each element of the Assembly shall be provided; and shall include system objectives, controlled plant start-up and shut-down procedures, automatic control, manual intervention, primary and secondary control routines, plant selection including duty and standby options, local and remote selections, operational and safety constraints, status information, alarms and control interfaces with control systems, fault routines, etc.

- The Operating and Maintenance Manual shall include 'as-installed and tested' information on both the hardware and software for each programmable device incorporated within the Assembly, including:
 - Overview of system operation in relation to the controlled plant.
 - System configuration.
 - Manufacturers' literature on operation, maintenance and testing of hardware and ancillaries, programming instructions, and diagnostics.
 - Hard copy program; with listings fully documented.
 - Listing of the final settings of all process dependent variables.
 - Permanent back-up copies, licensed in the name of the Client, shall be provided for all software, including operating programmes, application programs, and configuration software for all configurable devices.

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- Any interconnecting leads, protocol conversion modules, connectors, etc. necessary to connect and communicate with each programmable / configurable device to a standard portable Notebook.
- Manual format shall be A4 size on the filing side which shall be vertical with 20 mm margin for filing.

e) Training

- General

- The LV switchgear and Control Gear training shall form part of the overall training programme.
- The Contractor shall conduct training courses for designated personnel in the maintenance and operation of the Assemblies.
- The Assemblies shall be in a complete working order before training shall commence.
- A training schedule, together with the name and background of the person who will perform the training, shall be submitted to the Engineer for approval.
- Training and training manuals shall be based on the O&M Manuals.
- Training manuals shall be delivered for each trainee with two additional copies delivered for archival at the project site. The manuals shall include an agenda, defined objectives for each course.
- Where the Contractor presents portions of the course material by audio-visuals, copies of those audio-visuals shall be delivered to the Employer as part of the printed training manuals.
- The Employer reserves the right to videotape the training sessions for later use.
- The training shall include operator training and technical/maintenance training.
- During the installation phase, a person will be designated by the Employer to be closely involved with the installation and commissioning process. The intention is not to interfere with the Contractors' installation team, but to do observation in order to obtain the maximum possible information regarding the installation, to enable efficient maintenance to be undertaken by the Employer after final hand-over and expiring of the guarantee period.

f) Operations and Maintenance training sessions

- There shall be training sessions for the operation and maintenance of the Assemblies
- The program for the training shall include instruction for at least one day per Assembly (8 hours) instruction on-site.
- The program shall at a minimum cover the following:
 - General system overview
 - Functional operation of the system i.e.:
 - i) System start-up and shut-down procedures

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- ii) System access requirements
- iii) Alarms
- iv) Fault Finding
- v) Backup Power Procedure (if applicable)
- vi) Incident Reporting
- Maintenance
 - i) Maintenance Schedule
 - ii) Standard Maintenance Procedures
 - iii) Spare Part Lists
- Upon completion of the course, the operators should be fully proficient in the system operation and have no unanswered questions regarding the system.

C3.3.4.2.5 E100.5 LOW VOLTAGE SWITCHGEAR AND CONTROL GEAR ASSEMBLIES

C3.3.4.2.5.1 E100.5.1 SCOPE

a) Application

- This document specifies the standard requirements for the design, installation, testing and commissioning of electrical installations operating on voltages up to 1 000 Volts AC / 1 500 Volts DC.
- The primary intention of this specification is to ensure the provision of an electrical installation, which has been designed and constructed to ensure safe, reliable, operation and to facilitate safe inspection, testing and maintenance.
- Note, however, that this specification only covers such installations (or sections of installations) that are covered by SANS 10142-1. Note also that certain provisions of this specification are inappropriate for direct application to installations where additional measures (such as earthing, intrinsic safe equipment, etc.) are required by SANS 10142-1 and SANS 10108 (i.e. medical and hazardous locations). For these types of installations, thorough reference must be made to the relevant statutory documentation.

b) Electrical System Characteristics

- The design of the installation shall comply with SANS 10142-1.
- The design of the installation shall consider the following supply characteristics:
 - Voltage, frequency and number of phases
 - Maximum prospective short circuit current (phase to phase and phase to neutral)
 - Type of system, e.g. TN-S, TN-C-S
 - Maximum earth loop impedance of the earth fault path external to the installation
 - Type and rating of the cut-out or switch device

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- Load capability of the supply source, particularly the effects on the supply voltage of the starting of new equipment and any fault contributions from new equipment
- The installation of protective devices shall be correctly co-ordinated within the installation and with respect to existing installations. Discrimination studies shall be performed to validate the co-ordination of the installation.
- All equipment which requires operation or attendance by a person, or requires cleaning or maintenance in service, shall be constructed and installed to allow adequate and safe means of access and adequate working space for such activities. Similarly, the positioning of equipment shall not impede access to, or working space at, non-electrical equipment and services for operation and maintenance activities.
- The installation shall be suitable for access and use by electrically unskilled persons.
- Where additions or alterations to an existing installation are to be performed, the rating and condition of existing equipment, including that associated with the supply, shall be verified to confirm its suitability to carry any additional load. The earthing and equipotential bonding arrangements shall also be verified. No addition or alteration shall have an adverse effect on the existing installation.

C3.3.4.2.5.2 E100.5.2 STANDARDS

a) Associated Documentation

- This Specification identifies the Employer’s standard modifications and requirements which shall be applied to the statutory and recognized standards. The detailed specification of the project or site-specific requirements will be found in the Particular Specification and its accompanying Technical Data Sheets, which shall be read in conjunction with this Specification.
- Any items not specifically detailed in this Specification, which are necessary to provide a safe and fully operational working system, shall be deemed to be included.
- The Contractor shall operate an auditable quality assurance procedure covering the design, construction, inspection and testing of the installation.

b) Regulations, Specifications and Standards

- The design, construction, inspection and testing of the installation shall comply with all relevant Statutory Regulations and Directives including:
 - Occupational Health and Safety Act (Act 85 of 1993)
 - Construction Regulations 2003 issued in terms of Section 43 of the Act
 - Local Fire Regulations; and
 - Regulations of the Local Supply Authority
 - and the latest editions (current at the time of Tender) of all relevant South African National Standards, as well as International Standards, including but not limited to:

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |

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



Table 12: Section 5: Reference standards

| Standard Number | Description |
|------------------------|---|
| SANS 121 | Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods |
| SANS 156 | Moulded-case circuit-breakers |
| SANS 164 | Two-pole and earthing-pin plugs and socket outlets |
| SANS 475 | Luminaires for interior lighting, streetlighting and floodlighting - Performance requirements |
| SANS 767 | Earth leakage protection unit |
| SANS 950 | Unplasticized polyvinyl chloride rigid conduit and fittings for use in electrical installations |
| SANS 1063 | Earth rods, couplers and connections |
| SANS 1085 | Wall outlet boxes for the enclosure of electrical accessories |
| SANS 1088 | Luminaire entries and spigots |
| SANS 1091 | National colour standards of Paint |
| SANS 1195 | Busbars |
| SANS 1213 | Mechanical cable glands |
| SANS 1239 | Plugs, socket-outlets and couplers for industrial purposes |
| SANS 1266 | Ballasts for discharge lamps (excluding tubular fluorescent lamps) |
| SANS 1411 | Materials of insulated electric cables and flexible cords |
| SANS 1431 | Weldable structural steels |
| SANS 1507 | Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) |
| SANS 1700 | Fasteners |
| SANS 1777 | Photoelectric control units for lighting |
| SANS 1783 | Sawn softwood timber |
| SANS 1973 | Low-voltage switchgear and control gear Assemblies |
| SANS 10155 | Accuracy in buildings |
| SANS 10199 | The design and installation of earth electrodes |
| SANS 10225 | The design and construction of lighting masts |
| SANS 10177 | Fire testing of materials, components and elements used in buildings Part 2: Fire resistance test for building elements |
| SANS 10142-1 | Wiring of Premises Part 1: Low Voltage Installations |
| SANS 10400 | The application of the National Building Regulations |
| SANS 60269 | Low-voltage fuses |
| SANS 60309 | Plugs, socket-outlets and couplers for industrial purposes |
| SANS 60529 | Degrees of protection provided by enclosures (IP Code) |
| SANS 60614-2 | Conduits for electrical installations - Particular specification for conduits |
| SANS 60669 | Switches for household and similar fixed-electrical installations |
| SANS 60947 | Low-voltage switchgear and control gear |
| SANS 61000 | Electromagnetic compatibility (EMC) |
| SANS 61010 | Safety requirements for electrical equipment for measurement, control, and laboratory use |
| SANS 61048 | Auxiliaries for lamps - Capacitors for use in tubular fluorescent and other discharge lamp circuits - General and safety requirements |

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |

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



| Standard Number | Description |
|------------------------|---|
| SANS 61238 | Compression and mechanical connectors for power cables for rated voltages up to 30 kV (Um = 36 kV) |
| SANS 61643 | Low-voltage surge protective devices |
| Other Standards | Description |
| ARP 035 | Guidelines for the installation and maintenance of street lighting |
| BS 88 | Specification of supplementary requirements for fuses of compact dimensions for use in 240 / 415 V industrial and commercial electric installations |
| IEC 157 | Low voltage switchgear and control gear |
| IEC 408 | Low voltage air-break switches, air-break disconnectors, air-break switch disconnectors and fuse combination units |
| IEC 12373 | Aluminium and aluminium alloys. Anodizing. Method for specifying decorative and protective anodic oxidation coatings on aluminium |
| IEC 50086 | Conduit systems for cable management |
| IEC 60898 | Specification for circuit-breakers for overcurrent protection for household and similar installations |

- Standards are often tailored to the conditions of their country or origin (in terms of permissible voltages, expected ambient temperatures, etc.). Therefore, and unless normatively referenced to the contrary in a Standard of higher precedence, the decreasing order of precedence of Standards shall be:
 - South African National Standards (SANS, VC, etc.)
 - South African Sectoral Standards and Specifications (NERSA, CKS, ARP, NRS, PIESA, etc.)
 - ISO Standards
 - IEC Standards
 - Harmonized British Standards (BS EN)
 - Other Harmonized European National (EN) Standards (CEN, CENELEC, ETSI)
 - Non-Harmonized British Standards (BS)
 - Other international standards
- Where Standards of the same order are not in agreement with each other, the Standard with the most rigorous requirements shall apply.
- The installation shall also comply with:
 - This Specification, including all Technical Data Sheets; and
 - Any documentation issued by, or on behalf of, the Employer in respect of the Installation.

C3.3.4.2.5.3 E100.5.3 INSTALLATION OF CABLE SUPPORTS

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |

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



a) Cable Trays, Mesh and Ladders

– General

- Cable management systems (cable trays, cable ladders and cable mesh) shall be selected and installed strictly in accordance with their manufacturer’s guidelines, with a safety factor of 1.5 after taking into account maximum permissible loading and all external factors (not limited to wind, snow and thermal expansion). Upon demand to do so, the Contractor shall furnish all data and calculations he used to derive the type and spans of the systems to the Engineer.
- Notwithstanding above, the deflection of a cable management system due to installed cable weights shall be, in accordance with IEC 61537, limited to 1/100th of the span.
- Except where it is to be installed in locations with corrosive atmospheres, cable management systems shall be manufactured of galvanized and/or epoxy-powder coated steel. In locations with corrosive atmospheres, systems shall be manufactured from stainless steel (316 Marine Grade) or aluminium.
- All clamps, clips, hinges screws, bolts, nuts and support fittings used for fastening cable trays or cables shall be of the same material as the cable management system itself.
- Over and above the requirements of SANS 10142-1, all cable tray and ladder systems that will support telecommunication and / or control wiring shall be bonded in accordance with NRS 083-2 (gives details of bonding methods that provide enhanced protection against the effects of electromagnetic cross-interference).
- Cable management systems shall be selected and installed such that spare capacity (weight as well as height and width) of 20% will be available for the addition of future services (the cable management system to still exhibit a 1.5 safety factor after services were added).

– Perforated Cable Trays

- All cable trays shall be of the heavy duty, increased upstand (“side-rail”), type.
- Metal cable trays shall be manufactured from base-perforated (in excess of 30% of the surface area, in accordance with SANS 10142-1, in other words, class D according to Table 4 of IEC 61537) rolled steel. Metal trays manufactured to the following standards shall be used:
 - i) Less than 150 mm wide: 1,2 mm minimum thickness with 12 mm minimum upstand
 - ii) 150 mm to 450 mm: 1,2 mm minimum thickness with 19 mm minimum upstand
 - iii) Above 450 mm (heavy duty): 2,5 mm minimum thickness with 76 mm upstand
- The edges of cable trays are to be turned up on both sides to improve rigidity (return flange cable tray), and, where necessary, the sides of trays shall be reinforced with galvanised steel angles, minimum 25 x 25 x 3 mm, with 25 x 3 mm cross-braces at 600 mm centres.
- Cable trays shall be hot-dip galvanised only after the perforation and bending processes have been completed.

– Wire Mesh Cable Trays

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| Employer: | | Contractor: | |
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| Volume | 1 | 2 | 3 | | | |
| Part | T1 | T2 | C1 | C2 | C3 | C4 |



Wire mesh cable trays shall be manufactured from wire, resistance butt welded on all wire intersections. The tray shall be hot dip galvanized after completion of the manufacturing process. Heavy or medium duty trays may be used, ensuring that the selection of trays is suitable for the projected loading, as per manufacturer’s specification.

- Medium duty trays shall be manufactured from wires not less than 4mm diameter thick. The tray shall have a side upstand of no less than 50mm. The aperture sizes for the base shall not exceed 50 x 75 mm and 25 x 50mm for the side upstand.
 - Heavy duty trays shall be manufactured from wires not less than 5mm diameter thick. The tray shall have a side upstand of no less than 75mm. The aperture sizes for the base shall not exceed 50 x 50 mm and 25 x 50mm for the side upstand.
- Cable Ladders
- Metal cable ladders shall have side rails with 2 mm minimum thickness. Cross rungs shall be spaced at maximum intervals of 300 mm (measured between the centres of rungs). Where cables of 10 mm² or smaller are installed on cable ladders, the spacing of cross rungs shall be reduced to 125 mm.
 - Cable ladders consisting of slotted metal rails which accommodate plastic or metal cable binding bands may be used in vertical cable runs against walls, etc. These cable ladders will be considered in horizontal cable runs for small cables for communication and control wiring only after approval by the Engineer.
- Cable Tray and Ladder Connections
- Cable tray and ladder connections shall be suited to and of the same manufacture as the linear sections that they connect.
 - The dimensions of these connections shall correspond to the dimensions of the linear sections to which they are connected.
 - The radius of all bends shall be 1 m minimum. The inside dimensions of horizontal angles or connections shall be large enough to ensure that the allowable bending radii of cables are not exceeded.
 - Sharp angles shall be 45° mitred.
- Installation of Cable Ladders, Wire Mesh Cable Trays and Perforated Cable Trays
- Horizontal cable ladders and trays shall be suspended from the overhead structure, such as slab soffit or roof trusses/ purlins with hangers and P2000 or similar catalogue product as cross supports, at distances not exceeding 1,2m unless otherwise specified by the manufacturer. The hangers shall be galvanized threaded rods or steel cables, which shall be arranged to support the trunking rigidly in both directions. Where fixed to a concrete slab the hanger shall be fastened by a suitably sized expandable drop-in anchor, as specified and recommended by the manufacturer. Hangers fixed to an overhead steel roof structure, shall be fastened by supplier recommended standard catalogue product hanger brackets/ beam clamps, designed for this purpose. Make-shift and or self-manufactured brackets/ beam clamps will not be accepted. No cutting, drilling or any other modification may be done to the existing overhead steel structure, to accommodate and of fasten hanger brackets/ beam clamps to the said structure.
 - The use of wall mounted cantilever brackets for horizontally mounted cable trays shall be approved by the engineer, prior to installation. No installation of this mounting method shall commence, without written consent.

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| Employer: | | Contractor: | |
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| Volume | 1 | 2 | 3 | | | |
| Part | T1 | T2 | C1 | C2 | C3 | C4 |



- The spacing between tiers of ladders, trays and/or mesh shall be 300 mm minimum. Furthermore, they shall be installed such that a minimum separation of 300 mm exists between ceilings and the top of a tray or ladder (where the latter is installed horizontally) and 50 mm between the nearest sides of trays or ladders and the finished surfaces of walls, floors and ceilings for other configurations.
 - Fixing materials shall be compatible with cable management system materials and offer resistance to corrosion.
 - Cuts in trays shall not pass through perforations, except where practically impossible to implement.
 - Cable trays and mesh shall be mounted with a minimum air gap of 25 mm between the underside of the tray and the mounting surface.
- Installation of Cables on Cable Trays, Ladders and Mesh

Under no circumstances shall the cable support systems be used as ladders, walkways or any other form of support for people. This can lead to personal injury, possible damage to the cable support system and installed cables.

- Electrical MV and LV cables shall be installed on suitably sized cable ladders. MV and LV cables shall not share the same cable tray.
- Cables for communication and or other electronic services shall be installed on wire mesh cable trays. Cables shall be neatly bunched together by means of cable ties. Only cables of the same service (i.e. smoke detection, CCTV, audio, etc) shall be bunched together. Perforated cable trays may also be used in lieu of wire mesh cable trays. Electrical and electronic services cables shall not share the same cable tray.
- Cables shall be supported to avoid damage during installation, prior to dressing and fixing.
- Depending on the overall diameter, single cables and groups shall be secured according to the following.

Table 13: Installation of cables

| Fixing method | Overall diameter of cable |
|-------------------------------|---------------------------|
| Nylon UV Protected Cable Ties | < 35 mm |
| Propriety cable clamps | > 35 mm |

- In outdoor applications, where the installation maybe subject to ultra-violet light, PVC covered aluminium tape shall be used instead of nylon cable ties.
- Cables installed in groups shall be installed in straight lines and not cross over each other, except where single core cables need to be transposed.
- Where cables exit ladders, trays or mesh, the latter shall be formed or covered with PVC to ensure a smooth surface.
- Single core cables shall be installed in trefoil formation by means of non-magnetic type trefoil cable clamps. Only single core cables originating the same feeder shall be grouped together in the same trefoil formation.

C3.3.4.2.5.4 E100.5.4 DRAWINGS AND DOCUMENTATION

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |

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



a) General

- All drawings, information, and documentation shall be in English, and each item shall be identified with:
 - The Client’s name and contact details
 - Client’s project / scheme / contract reference title and numbers
 - The Engineer’s name and contact details
 - Engineers reference numbers
 - Contractor’s works / contract / order references.
- Drawings for acceptance shall be provided on A4 or A3 paper copies as specified.

b) Drawings for Approval

- The following documentation and drawings shall be submitted to the Engineer prior to the installation of cables and wireways and before civil construction have started on the areas where cable routes are required:
 - Cable route layout drawings showing
 - Type of wireways
 - Trenching
 - Cable junction boxes

c) As-built Drawings

- Detailed “as-built” drawings, clearly labelled as such, and consisting of three sets of drawings printed to their original size, and, where the original drawings were larger than A3, three sets of drawings printed (with reduced scaling, but without omitting any information from the printed area), to A3, shall be provided by the Contractor, indicating positions of the following:
 - Wireways (e.g. trenches, conduit, cables ladder/trays, power skirting etc.); and
 - Cable routes (including any cable joints)
 - General arrangement drawings
 - Single Line Diagrams

d) Operating and Maintenance Manual

- Three Operation Manuals, three Maintenance Manuals and three Certification copies shall be provided for all equipment supplied. The manuals shall be in A4 format.
- The operating and maintenance manuals shall include at least the following:
 - A schedule of installed components and equipment, containing the following information:

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |

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



- Manufacturers name and contact details
- Circuit number (DB name, circuit breaker e.g. DB01-CB08); and
- Function (e.g. switching lighting circuit DB03-L1)
- A schedule of all installed cables, with the following information:
 - Circuit number (DB name, circuit breaker e.g. DB01-CB08)
 - Size
 - Installed length; and
 - Function (e.g. "Feeding Submersible pump IW-SP-01")
- Description and details w.r.t:
 - Detailed description of the function of all operator controls
 - Procedures for fault finding
 - Maintenance instructions for all components and including repair, overhaul, change-out and installation procedures
 - Inspection schedules; and
 - Spare part information and recommended spares

C3.3.4.2.5.5 E100.5.5 TESTING AND COMMISSIONING

a) General

- The installation shall be inspected and tested in accordance with SANS 10142-1.
- Inspection and testing shall only be performed by personnel with approved, current qualifications. The Contractor shall provide qualified personnel for the supervision for all inspection and testing activities.
- The Contractor shall provide all necessary safety equipment and test instruments. All test instruments shall comply with SANS 61010 and be covered by a current test and calibration certificate.
- The Contractor's safe working arrangements shall comply with the safety management systems and procedures prevailing on site. Where there may be a risk of injury to personnel, the Contractor shall submit a risk assessment and method statement for approval, prior to starting work.
- Unless otherwise specified in the Particular Specification, all inspection and test results shall be recorded using pro-forma documentation (test certificates and schedules) complying with SANS 10142-1.
- The Contractor shall make provision for all inspection and testing activities to be witnessed. Unless otherwise specified in the Particular Specification, the period of notice for witness testing shall be 5 working days.
- Where most of the inspection and testing activities are not witnessed, the Contractor shall allow for 10% of the inspection and testing activities to be repeated for witness testing.

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| Employer: | | Contractor: | |
| Witness: | | Witness: | |

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



- If there is a requirement for additional inspection and test activities to be performed as part of process commissioning, this shall be specified in the Particular Specification.
- Unless otherwise agreed by the Employer, no part of the installation shall be commissioned until all defects or omissions revealed by inspection and testing have been rectified. Where a defect or omission renders all or part of the installation unsafe for use, the Contractor shall take approved precautions to ensure that no part of the installation can be commissioned.

b) Test Sequence

- Inspections before Testing
 - Before testing, inspections shall be performed to verify:
 - All equipment and material is of the correct type and complies with applicable SANS and IEC standards
 - All parts of the installation are correctly selected and erected
 - No part of the installation is visibly damaged or otherwise defective
 - The installation is suitable for the environmental conditions; and
 - The installation complies with this Specification
- Testing of Installation
 - On satisfactory completion of the inspections specified in 5.2.1, the following tests shall be undertaken in the sequence listed as per SANS 10142-1:
 - Continuity of conductors
 - Resistance of earthing conductor
 - Continuity of ring circuits earth fault loop impedance at main switch
 - Elevated voltage on supply neutral earth resistance
 - Insulation resistance
 - Voltage, main distribution board - no load
 - Voltage, main distribution board - on load
 - Voltage at available load
 - Operation of earth leakage units
 - Earth leakage test button
 - Polarity at points of consumption
 - Switching devices

C3.3.4.2.6 E100.6 LOW VOLTAGE SWITCHGEAR AND CONTROL GEAR ASSEMBLIES

C3.3.4.2.6.1 E100.6.1 SCOPE

a) Application

| | | | |
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| Employer: | | Contractor: | |
| Witness: | | Witness: | |

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



- This document specifies the standard requirements for the design, installation, testing and commissioning of electrical installations operating on voltages up to 1 000 Volts AC / 1 500 Volts DC.
- The primary intention of this specification is to ensure the provision of an electrical installation, which has been designed and constructed to ensure safe, reliable, operation and to facilitate safe inspection, testing and maintenance.
- Note however that this specification only covers such installations (or sections of installations) that are covered by SANS 10142-1. Note also that certain provisions of this specification are inappropriate for direct application to installations where additional measures (such as earthing, intrinsic safe equipment, etc.) are required by SANS 10142-1 and SANS 10108 (i.e. medical and hazardous locations). For these types of installations, thorough reference must be made to the relevant statutory documentation.

b) Electrical System Characteristics

- The design of the installation shall comply with SANS 10142-1.
- The design of the installation shall consider the following supply characteristics:
 - Voltage, frequency and number of phases
 - Maximum prospective short circuit current (phase to phase and phase to neutral)
 - Type of system, e.g. TN-S, TN-C-S
 - Maximum earth loop impedance of the earth fault path external to the installation
 - Type and rating of the cut-out or switch device
 - Load capability of the supply source, particularly the effects on the supply voltage of the starting of new equipment and any fault contributions from new equipment
- The installation protective devices shall be correctly co-ordinated within the installation and with respect to existing installations. Discrimination studies shall be performed to validate the co-ordination of the installation.
- All equipment which requires operation or attendance by a person, or requires cleaning or maintenance in service, shall be constructed and installed to allow adequate and safe means of access and working space for such activities. Similarly, the positioning of equipment shall not impede access to, or working space at, non-electrical equipment and services for operation and maintenance activities.
- The installation shall be suitable for access and use by electrically unskilled persons.
- Where additions or alterations to an existing installation are to be performed, the rating and condition of existing equipment, including that associated with the supply, shall be verified to confirm its suitability to carry any additional load. The earthing and equipotential bonding arrangements shall also be verified. No addition or alteration shall have an adverse effect on the existing installation.

C3.3.4.2.6.2 E100.6.2 STANDARDS

- Associated Documentation

| | | | |
|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |

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|---------------|----|----------|----|----|-----------|----|
| Volume | 1 | 2 | 3 | | | |
| Part | T1 | T2 | C1 | C2 | C3 | C4 |



- This Specification identifies the Employer’s standard modifications and requirements which shall be applied to the statutory and recognized standards. The detailed specification of the project or site-specific requirements will be found in the Particular Specification and its accompanying Technical Data Sheets, which shall be read in conjunction with this Specification.
- Any items not specifically detailed in this Specification, which are necessary to provide a safe and fully operational working system, shall be deemed to be included.
- The Contractor shall operate an auditable quality assurance procedure covering the design, construction, inspection and testing of the installation.
- Regulations, Specifications and Standards
 - The design, construction, inspection and testing of the installation shall comply with all relevant Statutory Regulations and Directives including:
 - Occupational Health and Safety Act (Act 85 of 1993)
 - Construction Regulations 2003 issued in terms of Section 43 of the Act
 - Local Fire Regulations; and
 - Regulations and by-laws of the Local Supply Authority

and the latest editions (current at the time of Tender) of all relevant South African National Standards, as well as International Standards, including but not limited to:

Table 14 Section 6: Reference standards

| Standard Number | Description |
|------------------------|---|
| SANS 32 | Internal and/or external protective coatings for steel tubes - Specification for hot dip galvanized coatings applied in automatic plants |
| SANS 97 | Electric cables – Impregnated paper insulated metal-sheathed cables for rated voltages 3,3/3,3kV to19/22kV (excluding pressure assisted cables) |
| SANS 121 | Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods |
| SANS 156 | Moulded-case circuit-breakers |
| SANS 164 | Two-pole and earthing-pin plugs and socket outlets |
| SANS 475 | Luminaires for interior lighting, street lighting and floodlighting - Performance requirements |
| SANS 767 | Earth leakage protection unit |
| SANS 950 | Unplasticized polyvinyl chloride rigid conduit and fittings for use in electrical installations |
| SANS 1063 | Earth rods, couplers and connections |
| SANS 1085 | Wall outlet boxes for the enclosure of electrical accessories |
| SANS 1088 | Luminaire entries and spigots |
| SANS 1091 | National colour standards of Paint |
| SANS 1195 | Busbars |
| SANS 1213 | Mechanical cable glands |
| SANS 1239 | Plugs, socket-outlets and couplers for industrial purposes |
| SANS 1266 | Ballasts for discharge lamps (excluding tubular fluorescent lamps) |

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



| Standard Number | Description |
|------------------------|---|
| SANS 1411 | Materials of insulated electric cables and flexible cords |
| SANS 1431 | Weldable structural steels |
| SANS 1507 | Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) |
| SANS 1700 | Fasteners |
| SANS 1777 | Photoelectric control units for lighting |
| SANS 1783 | Sawn softwood timber |
| SANS 1973 | Low-voltage switchgear and control gear Assemblies |
| SANS 2001 | Construction Works |
| SANS 10155 | Accuracy in buildings |
| SANS 10199 | The design and installation of earth electrodes |
| SANS 10225 | The design and construction of lighting masts |
| SANS 10177 | Fire testing of materials, components and elements used in buildings Part 2: Fire resistance test for building elements |
| SANS 10142-1 | Wiring of Premises Part 1: Low Voltage Installations |
| SANS 10400 | The application of the National Building Regulations |
| SANS 60269 | Low-voltage fuses |
| SANS 60309 | Plugs, socket-outlets and couplers for industrial purposes |
| SANS 60529 | Degrees of protection provided by enclosures (IP Code) |
| SANS 60614-2 | Conduits for electrical installations - Particular specification for conduits |
| SANS 60669 | Switches for household and similar fixed-electrical installations |
| SANS 60947 | Low-voltage switchgear and control gear |
| SANS 61000 | Electromagnetic compatibility (EMC) |
| SANS 61010 | Safety requirements for electrical equipment for measurement, control, and laboratory use |
| SANS 61048 | Auxiliaries for lamps - Capacitors for use in tubular fluorescent and other discharge lamp circuits - General and safety requirements |
| SANS 61238 | Compression and mechanical connectors for power cables for rated voltages up to 30 kV (Um = 36 kV) |
| SANS 61643 | Low-voltage surge protective devices |
| Other Standards | Description |
| ARP 035 | Guidelines for the installation and maintenance of street lighting |
| BS 88 | Specification of supplementary requirements for fuses of compact dimensions for use in 240 / 415 V industrial and commercial electric installations |
| IEC 157 | Low voltage switchgear and control gear |
| IEC 408 | Low voltage air-break switches, air-break disconnectors, air-break switch disconnectors and fuse combination units |
| IEC 12373 | Aluminium and aluminium alloys. Anodizing. Method for specifying decorative and protective anodic oxidation coatings on aluminium |
| IEC 50086 | Conduit systems for cable management |
| IEC 60898 | Specification for circuit-breakers for overcurrent protection for household and similar installations |

- Standards are often tailored to the conditions of their country or origin (in terms of permissible voltages, expected ambient temperatures, etc.). Therefore, and unless normatively referenced to the contrary in a Standard of higher precedence, the decreasing order of precedence of Standards shall be:

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|-----------|--|-------------|--|
| Employer: | | Contractor: | |
| Witness: | | Witness: | |

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- South African National Standards (SANS, VC, etc.)
 - South African Sectoral Standards and Specifications (NERSA, CKS, ARP, NRS, PIESA, etc.)
 - ISO Standards
 - IEC Standards
 - Harmonized British Standards (BS EN)
 - Other Harmonized European National (EN) Standards (CEN, CENELEC, ETSI)
 - Non-Harmonized British Standards (BS)
 - Other international standards
- Where Standards of the same order are not in agreement with each other, the Standard with the most rigorous requirements shall apply.
- The installation shall also comply with:
- This Specification, including all technical data sheets; and
 - Any documentation issued by, or on behalf of, the Employer in respect of the Installation.

C3.3.4.2.6.3 E100.6.3 COMPONENTS AND EQUIPMENT

a) General

- All equipment and components shall be suitable for their operating environment, particularly with respect to the following:
- The degree of ingress protection against dust and moisture (IP rating)
 - The corrosion resistance of the materials of construction; and
 - Mechanical properties (especially impact strength)

b) Power Outlets

– Commercial Socket Outlets

- All socket outlets with switches shall fully comply with SANS 164-0 and SANS 60669-1.
- Flush mounting units shall be suitable for a wall box of not less than 100 x 100 x 50 mm deep.
- Surface mounted patterns shall be housed in heavy pressed steel boxes.
- Any socket outlet exposed to weather, condensation, dripping or splashing of water shall have a rating of at least IP44.
- All socket outlets with switches shall be continuously rated at 16A and shall be suitable for operation on a 250V, 50 Hz, AC system.

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- All socket outlets shall have shutters included on the live and neutral socket holes.
- Cover plates shall have bevelled edges which overlap the box.
- Socket outlets and their cover plates must adhere to the following colour and earth pin convention:
 - SANS 164-1, white (conventional system), 16A, 2-pin with round earth pin shall be protected by an earth leakage sensing device.
 - SANS 164-2, white (IEC system), 16A, 2-pin with round earth pin shall be protected by an earth leakage sensing device.
 - SANS 164-3, white (conventional system), 6A, 2-pin with round earth pin, shall only be used for connecting luminaires. The use thereof is not covered by this part of the specification.
 - SANS 164-4, red (dedicated system), 16A, 2-pin with 0° shaven earth pin is not protected by an earth leakage sensing device. This socket outlet would generally be connected to a dedicated supply system (this outlet shall be referred to as "red dedicated").
 - SANS 164-4, black (dedicated system), 16A, 2-pin with -53° shaven earth pin is not protected by an earth leakage sensing device. This socket outlet would generally be connected to a dedicated supply system (this outlet shall be referred to as "black dedicated").
 - SANS 164-4, blue (dedicated system), 16A, 2-pin with +53° shaven earth pin is not protected by an earth leakage sensing device. This socket outlet would generally be connected to a dedicated supply system (this outlet shall be referred to as "blue dedicated").
 - SANS 164-6, white (two-pole system for connection of class II equipment), 16A, 2-pin, un-earthed (the earthed version of this socket outlet is illegal in South Africa and may not be used). The contractor shall only install this socket outlet under specific instruction of the engineer (this outlet is also referred to as a "Schuko" socket outlet).
 - BS1363-2, 13A, rectangular 3-pin, British type socket outlet shall not be used.
- Industrial Socket Outlets
 - Plugs, couplers and socket outlets shall conform to the requirements of SANS 1239.
 - Where pilot connections are required, they shall disconnect before the main phase connectors disconnect.
 - 3-Phase Socket Outlets
 - 400V socket outlets shall be five poled (three phases, one neutral and one earth), incorporating isolation mechanically interlocked with the plug.
 - The equipment enclosures shall be at least IP 55 to SANS 60529.
 - All welding plugs and socket outlets shall be 5 poled (3-phase, plus neutral, plus earth).
- Single Phase Outlets

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- 16 A, 250 V socket outlets shall be two pole and earth, incorporating isolation mechanically interlocked with the plug.
- Local Isolators (Switch-disconnectors)
 - Local isolators shall be selected from the following:
 - Isolator in accordance with SANS 60947-3, complete with additional late-make, early-break auxiliary contacts as required
 - Plug and socket assembly to SANS 60309-1 and SANS 60309-2, incorporating isolation mechanically interlocked with the plug; or
 - Plug and socket assembly to SANS 60309-1 incorporating a de-contactor arrangement or additional late-make early-break auxiliary contacts.
- Local isolators exposed to the weather, condensation, dripping or splashing of water shall have a rating of at least IP44.

C3.3.4.2.6.4 E100.6.4 INSTALLATION OF COMPONENTS AND EQUIPMENT

a) General

- Final positions of equipment shall be agreed with the Engineer on site, prior to installation.
- All equipment shall be securely mounted using propriety (i.e. suited to and manufactured for such use) fixtures and fittings.
- The method of equipment installation shall not adversely affect the function or structural integrity of the structure to which the equipment is attached.
- Equipment terminals and covers shall be readily and safely accessible after installation.
- The method of equipment installation shall not adversely affect the IP rating of the equipment.
- No horizontal chasing shall be allowed into brick or concrete work.
- It is the Contractor’s responsibility to work closely together with the relevant parties responsible for the civil construction work to establish coordination in the installation program of components and conduits, as well as to establish a neat installation showing no indication of ‘last minute changes’. Modification to existing structures shall be approved by the Engineer.
- Framework and Brackets
 - Site-fabricated framework and brackets shall not be used.
 - Framework and brackets shall be positioned so as not to adversely affect the removal and replacement of equipment.
 - Where it is necessary to modify on site any pre-fabricated galvanized mild steel framework, the cut edges shall be dressed and treated immediately with an approved cold-galvanizing paint to prevent corrosion.
- Fasteners

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- Fasteners securing equipment to framework and brackets shall be independent of those securing framework and brackets to walls and floors.
- No electroplated fasteners will be allowed. Only hot dipped galvanized or stainless steel fasteners will be allowed.
- Positioning of Equipment
- Equipment shall be positioned with due regard to the aesthetics of the installation.
- Equipment (e.g. outlets, switches, distribution boards, etc.) shall be installed plumb. If an imaginary line is drawn from the vertical side of any such component, the deviation of such imaginary line from the vertical shall not exceed ± 5 mm for every 1 m increase in height, with a maximum deviation from the vertical of ± 10 mm.
- The permissible deviation from the mounting heights indicated for equipment covered by this document shall be ± 10 mm, with a maximum of ± 5 mm deviation from the horizontal between adjacent outlets, isolators, luminaires, assemblies and / or switches.
- Where a group comprises a number of items at different mounting heights, with not more than one item at any one height, then all items shall be sited on a common vertical centre line.
- Where a group comprises a number of items mounted at the same height, then all items shall be sited on a common horizontal centre line.
- Where a group comprises a number of different sized items, they shall be arranged with the largest item at one end of the group and a progressive reduction in size of the remaining items.
- Where a group comprises a number of items at different mounting heights with more than one item at any height, then a common vertical centre line shall be established and the items arranged on, or symmetrically about, this centre line.
- Where a group comprises a number of items at the same mounting height with more than one item at the same position, then a common horizontal centre line shall be established and the items arranged on, or symmetrically about, this centre line.

– Mounting Height of Components

- Mounting heights shall be as follows unless otherwise specified:

Table 15: Mounting height of components

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| Distribution boards | Top frame 2000 mm above finished floor level, except where the board may be accessible to infants, where then the bottom frame shall be 1200 mm above finished floor level |
| Switches | All security controls and light switches shall be horizontally aligned with door handles and other fixtures and fittings (other than socket outlets) between 900 mm and 1,2 m above the finished floor level |
| Socket outlets | See 4.2 |
| Telephone outlets | See 4.3 |

- All indoor switches and socket outlets shall be of the flush mounted type.

b) Installation of Socket Outlets

- General

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- The Contractor should only start installation of power outlets in the conduit outlets after plasterers and painters have completed their work in the vicinity of the outlet.
 - Socket outlets shall be installed at the following heights above finished floor level, measured to the underside of the outlet, unless otherwise specified:
 - 300 mm above finished floor level for general applications
 - 500 mm above fixed ground level where they are to be installed outside buildings
 - 1200 mm above finished floor level in kitchens
 - 300 mm above counter tops
 - Connections to geysers
 - Each geyser shall be connected to a separate circuit with a separate earth conductor.
 - The conduit from the distribution board shall terminate in a 100 x 100 x 50 mm outlet box within 1 metre of the geyser. A suitably rated double pole isolator shall be installed in the outlet box. A flexible length of conduit shall be installed between the isolator and the geyser.
 - Connections to heaters, fans, air conditioners and hand blowers
 - A suitably rated double pole isolator shall be supplied and installed within 1 metre of heaters, fans and air conditioners. Where the equipment is out of reach the isolator, which must then be of the type capable of being locked in the open position, shall be installed 1.5 m above floor level, and a sign indicating location of the isolator shall be fixed onto or next to the equipment that it switches. Flexible cords may be used for the final connection to the equipment, provided the cables are correctly current rated.
 - Where control units (for HVAC, BMS, etc.) are to be installed, the units shall be installed 1.5 m above the finished floor level.
- c) Installation of Telecommunication Services and Accessories
- Telephone distribution boards
 - Telephone distribution boards are to be installed with their bottom frames 1 200 mm above finished floor level.
 - All conduits and sleeves to telephone outlets or telephone sub-distribution boards in the buildings or elsewhere on the site, as well as the main incoming sleeves, shall terminate at the main telephone distribution board, as shown on the relevant drawing.
 - Separation of services
 - Wireways provided for telecommunication or other related services shall under no circumstances be used for any other purpose.
 - Power cables, conductors and accessories shall be installed at a minimum distance of 300 mm away from the routes reserved for telecommunication cables.
 - Conduits and other channels shall be installed in such a way as to avoid telecommunication cables from crossing power cables.

d) Telecommunication outlets

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- Telephone and / or data outlets in walls shall comprise of 100 x 100 x 50 mm deep wall boxes which shall be flush mounted in the wall, in the position shown on the relevant drawing, with the underside fixed 300 mm above the finished floor level, unless otherwise specified. The wall box shall be fitted with a white coloured blank cover plate.
- All outlet boxes shall align neatly with adjacent socket outlet wall boxes.
- Outlets in floors fitted with floor ducting shall be of the same type as the floor outlets for power socket outlets and shall be provided in the same outlet box.
- Outlets in power skirting shall be provided at the positions indicated on the relevant drawing, and the Contractor need only provide a separate short length power skirting cover at these positions. The cover for the fixing of outlet shall not exceed 250 mm in length and shall be secured in such a manner that adjacent cover plate sections can be removed without disturbing the telephone outlet.

C3.3.4.2.6.5 E100.6.5 WIREWAYS

a) Conduit

- Plain-end metallic conduit and accessories
 - Plain-end conduit shall be manufactured from mild steel having a minimum wall thickness of 0.9 mm and shall comply with SANS 60614.
 - Galvanised conduits shall be hot-dipped on both the internal and external surfaces, in accordance with SANS 121.
 - Epoxy powder-coated metal conduit may not be used in installations where bending of conduit will be required (unless prior approval of use has been granted by the Engineer).
 - Bending and setting of plain-end conduit shall be undertaken using the correct bending apparatus as recommended by the manufacturer of the conduit. After the bending of galvanized conduit, cold galvanizing paint shall be applied.
- PVC conduit and accessories
 - PVC conduit shall comply with SANS 950 and shall bear the SABS mark.
 - PVC conduit shall be constructed from rigid PVC. PVC conduit shall be white in colour and shall be non-flammable. The minimum softening temperature shall be 75°C.
 - All PVC conduit accessories shall be fully in accordance with SANS 950 and shall bear the SABS mark.
- Flexible conduit
 - Flexible steel conduit and adaptors shall comply with IEC 50086 where applicable.
 - Flexible steel conduit shall be of a galvanised steel construction. It does not need to be waterproof but shall be vermin proof and suitable for protection of cables against mechanical damage.
 - In moist or damp areas, flexible steel conduit shall be of the plastic sheathed galvanised steel type.
 - Flexible polypropylene tubing shall only be fastened to PVC conduit installations.

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– Conduit Accessories

- Earth clamps
 - Earth clamps shall comprise of copper strips having a minimum thickness of 1 mm and shall not be less than 12 mm wide. Earth clamps shall be provided complete with a 25 mm x 4 mm brass bolt, washer and nut and shall be constructed such that the clip can be firmly attached to the conduit without the need for any additional packing.
- Flush mounted wall boxes
 - Flush mounted PVC wall boxes shall be manufactured from rigid PVC and shall be white in colour. All PVC wall boxes shall comply with SANS 950. “Open-back” type wall boxes will not be accepted.
 - Flush mounted steel wall boxes shall be manufactured from heavy gauge sheet steel and shall be galvanised. All steel wall boxes shall comply with SANS 1085.
 - The boxes shall be provided with the necessary mounting lugs to suit the units for which the box is intended and be provided with 20 mm knock-outs.
 - Facilities shall be provided for the fixing of earth terminals to the box.
- Round group-type circular boxes
 - Steel round boxes shall be manufactured in accordance with SANS 1065 and shall be of the long spout pattern, constructed from either store enamelled jet black or galvanised steel, or from malleable cast iron.
 - PVC round boxes shall be manufactured in accordance with SANS 950 and of the same dimensions but having web-reinforced spouts.
 - The two cover fixing holes of both steel and PVC boxes shall be diagonally opposite each other and shall be drilled and tapped at 50 mm centres. Internal dimensions shall be approximately 60 mm in diameter by 60 mm deep for use in concrete work. Shallower boxes shall be used in open roof spaces.
 - The cover screw pillars shall be provided with tapped brass inserts and provision shall be made for a brass earthing terminal adjacent to one or both of the pillars.
 - PVC round box covers shall be of PVC and shall be secured by means of brass screws at 50 mm centres.

– Draw wires

- Draw wires for unused conduits shall either be galvanised steel wire or nylon, but shall have a minimum diameter of 2 mm.

– Conduit Installation

- General
 - The conduit installation shall comply with par. 6.5 of SANS 10142-1.
 - Where the conduit installation is surface mounted, space-bar saddles must be used in order to provide an air gap between the conduit and mounting surface.

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- The conduit system shall be mechanically continuous, secure and shall be able to be re-wired.
 - All unused, screwed entries shall be fitted with a blanking plug. Female PVC bushes shall be fitted to all free ends.
 - Conduits shall not be used to support the weight of fittings etc., except where specifically designed to do so. Conduit boxes supporting luminaires or accessory boxes shall be fixed to the fabric of the building independently of the conduit.
 - Sufficient conduit and drawing boxes shall be provided to facilitate cable installation and removal. In general, no more than 2 bends or off-sets or one coupling shall be permitted without a conduit box.
 - Steel conduit shall not be relied upon for earth continuity
 - All PVC conduits shall be installed in accordance with Appendix C, SANS 950.
 - Draw boxes should be as far as possible be placed out of sight and shall be indicated on the "as built" drawings.
 - The edge of flush mounted outlet boxes shall not be deeper than 10 mm from the final surface. Where necessary, spacer springs shall be used under screws.
 - Oversize cover plates shall be provided on all flush mounted round conduit boxes, where required. Surface mounted boxes shall be provided with standard size cover plates.
- Flexible conduit
- In installations where the equipment has to be moved frequently to enable adjustment during normal operation, for the connection of motors or any other vibrating equipment, for the connection of thermostats and sensors on equipment, for stove connection and where otherwise required, flexible conduit shall be used for the final connection to the equipment.
 - Flexible conduit shall be connected to the remainder of the installation by means of a draw box. The flexible conduit may be connected directly to the end of a conduit if an existing draw box is available within 2 m of the junction and if the flexible conduit can easily be rewired.
 - Flexible conduit shall consist of metal reinforced plastic conduit or PVC covered metal conduit with an internal diameter of at least 15 mm, unless approved to the contrary. In false ceiling voids, flexible conduit of galvanized steel construction may be used. Connectors for coupling to the flexible conduit shall be of the gland or screw-in type, manufactured from either brass or mild steel plated with zinc or cadmium.
- Installation in concrete
- In order not to delay building operations, the electrical Contractor shall ensure that all conduits and accessories which are to be cast in concrete are placed in position in good time. The Contractor or his representative shall be in attendance when the concrete is cast.
 - Draw boxes, expansion joints and round ceiling boxes shall be installed where required and shall be neatly finished to match the finished slab and wall surfaces. Ceiling draw boxes shall be of the deep recessed type. In columns where flush mounted draw boxes are installed, the conduits shall be offset from the surface of the column immediately after leaving the draw box.

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- Sharp bends and elbows for conduits of 32 mm diameter will not be allowed in concrete slabs.
 - Draw boxes and/or inspection boxes shall, where possible, be grouped together under a common approved cover plate. The cover plate shall be secured by means of brass screws.
 - All conduits shall be installed as close as possible to the neutral axis of concrete beams, slabs and columns. The conduits shall be rigidly secured to the reinforcing to prevent movement towards the surface of the concrete.
 - All conduits, draw boxes, etc., shall be securely fixed to the shuttering to prevent displacement when concrete is cast. Draw boxes and outlet boxes shall preferably be secured by means of a bolt and nut installed from the back of the box through the shuttering. Fixing lugs may also be used to screw the boxes to the shuttering where off-shutter finishes are required. Where fibre glass shuttering is used by the builder, the equipment shall be fixed to the steel only and no holes shall be drilled or made in shuttering. All draw boxes and outlet boxes shall be plugged with wet paper before they are secured to the shuttering.
 - As far as possible, conduits shall not be installed across expansion joints. Where this is unavoidable a conduit expansion joint shall be provided. The expansion joint shall consist of two draw boxes with an interlinking flexible conduit connection. The draw box shall be installed adjacent to the expansion joint of the structure and a conduit sleeve, one size larger than that specified for the circuit, shall be provided on the side of the draw box nearest to the joint. The one end of the sleeve shall terminate at the edge of the joint and the other shall be secured to the draw box. The circuit conduit passing through the sleeve shall be terminated 40 mm inside the draw box, and, in the case of metallic conduit, the conduit end shall be fitted with a brass bush. The gap between the sleeve and the conduit at the joint shall be sealed with TiC-TaC (Titanium Carbide / Tantalum Carbide) or equal sealing compound, to prevent the ingress of wet cement. The other end of the circuit conduit shall be secured to the draw box by means of a standard bushed adaptor for other PVC types. The cover plates shall be installed before the ceiling is painted. Where a number of conduits are installed in parallel, they shall cross the expansion joint of the structure via a single draw box. A number of draw boxes adjacent to each other will not be allowed.
 - The installation of conduits in floor screed shall be kept to a minimum. Where conduits are installed in screed, the top of the conduit shall be at least 20 mm below the surface of the screed. Where the screed is laid directly on the ground, galvanized conduits shall be used. A minimum distance of twice the outside diameter of the conduit shall be left free between adjoining conduits. Conduits shall be secured to the concrete slab at intervals not exceeding 2,0 m. The Contractor shall ensure that conduits are not visible above the screed where the conduits leave the screed.
 - All draw boxes, conduits, etc., which are installed in concrete shall be cleaned with compressed air and provided with draw wires two days after removal of the shuttering. Errors that occurred during the installation of the conduits, or any lost draw boxes or blocked conduits shall be reported to the Engineer immediately.
 - Where it is necessary to cut or drill holes in the concrete structure, prior permission shall be obtained from the Engineer in writing.
- Installation in brickwork
- Recessed conduits and accessories installed in brickwork shall be built-in. In order not to delay building operations the Contractor shall ensure that all conduits and accessories which are to be built-in are placed in position in good time.

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- Any conduit draw boxes, outlet boxes, etc., which have been damaged, lost or omitted, shall immediately be reported to the Engineer.
- Surface and roof space installations
 - All conduits shall be installed horizontally or vertically as determined by the route. The electrical Contractor shall take all measures to ensure a neat installation.
 - Conduits shall be firmly secured by means of saddles and screws and in accordance with SANS 10142, par. 5.4.2(b). Conduits shall be secured within 150 mm before and after each 90° bend.
 - Only approved plugging materials, such as fibre plugs or plastic plugs, etc., and round head screws shall be used when fixing saddles, switches, plugs etc., to walls. Wood plugs are not acceptable, nor should plugs be installed in joints in brick walls.
- Chasing and builder's work
 - Except where the project involves upgrading existing facilities, all flush mounted conduits, accessories, switchboard trays, bonding trays etc., shall be built-in and no chasing shall be allowed.
- Installation of Cables in Conduit
 - The cable installation in the conduit shall conform to par. 6.5.6 of SANS 10142-1 and other portions of SANS, where applicable.
 - Conduit shall be deburred and swabbed prior to cables being pulled in.
 - Cables of other classifications and purpose (e.g. DC, Fire Detection, Audio, etc.) shall be installed in separate conduits.
 - Circuits supplied from different distribution boards shall not be installed in the same conduit.
 - Final sub-circuits shall not be installed in the same conduit as sub-mains circuits.

b) Power Skirting

- Construction
 - Power skirting must comply with all relevant parts of SANS 61084.
 - Except where room dimensions dictates shortening thereof, in which case only one length per wall may be trimmed, power skirting and covers shall be installed in their standard (manufactured) lengths.
 - The covers shall either snap on or shall be fixed by means of toggle or swivel nuts.
 - Only socket outlets that are compatible for use with the particular type of power skirting may be used.
 - Propriety internal and external bends, and off-sets of the same manufacture and product range, shall be used.

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- Over and above the requirements of SANS 10142-1, all conductive power skirting that will contain telecommunication and / or control wiring shall be bonded in accordance with NRS 083-2 (details bonding methods that provide enhanced protection against the effects of electromagnetic cross-interference).

– Installation

- The bottom of the power skirting shall be installed at finished floor level, unless otherwise specified.
- Conduits for the circuit wiring to the power skirting must terminate in flush conduit boxes behind the power skirting at the respective heights of the compartments for the telephone, power and other service compartments.
- Notwithstanding the requirement to provide adequate capacity for the installation of data and telecommunication cables, conduits installed to power skirting installations shall have a minimum of 50% spare capacity, to allow for future expansion
- The wiring shall pass through large diameter holes, suitably bushed, cut in the rear of the power skirting. Where metallic skirting is installed, the holes shall be provided with rubber grommets.
- Where power skirting is interrupted by doorways, bridging conduits shall be installed for each of the service compartments.
- To allow for the easy removal of plugs from outlets, in multi compartment installations the bottom compartment(s) shall be for telecommunication services and the top compartment(s) for power circuits.

c) Cable Trunking

– Construction

- Cable trunking shall comply with all relevant parts of SANS 61084.
- Trunking shall be manufactured from galvanized metal and shall be supplied complete with PVC covers. PVC trunking will not be accepted.
- Cable trunking and covers shall be installed in their standard (manufactured) lengths, except at the end of runs as dictated by room dimensions.
- The covers shall either snap on or shall be fixed by means of toggle or swivel nuts.
- Propriety internal and external bends, and off-sets of the same manufacture and product range, shall be used.

– Installation

- Horizontal trunking shall be suspended from the overhead structure, such as slab soffit or roof trusses/ purlins with hangers and suitable brackets, at distances not exceeding 1,2 m or as specified by the manufacturer. The hangers shall be galvanized threaded rods or galvanized steel cables, which shall be arranged to support the trunking rigidly in both directions. Where fixed to a concrete slab the hanger shall be fastened by a suitably sized expandable drop-in anchor, as specified by the supplier. Hangers fixed to an overhead steel roof structure, shall be fastened by supplier recommended standard catalogue products, designed for this purpose.

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- All wiring exiting cable trunking into an adjacent trunking or electrical enclosure, shall pass through large diameter holes, suitably bushed or provided with grommets, with cut-outs at the rear of the trunking.
- Where innovative wiring enters/ exits cable trunking, it shall be provided with a neoprene compression gland.

d) Wiring inside wireways

– General

- All unarmoured conductors shall be installed in conduits, trunking or power skirting, and such conductors shall not be exposed to possible mechanical damage.
- Any debris and moisture inside of wireways shall be removed prior to the installation of conductors.
- In the event that lubrication of cables is required in order to facilitate their installation, the lubricant shall be suitable for use with the type of cable as well as the type of wireway. The Contractor shall take steps to ensure that only the minimum amount of lubrication is applied. Should any seepage of lubricants into building elements or fixtures occur, it shall be the responsibility of the Contractor to remove the oil and fix the damaged building elements or fixtures, regardless of whether he installed the wireways or not.

– Circuits

- The circuits for the installation are indicated on the relevant drawings. Where not indicated on the drawings, the maximum number of points to be connected to each type of circuit shall be:

Table 15: Circuits

| | | |
|--|---|----------|
| Light points per circuit | = | 8 |
| Single socket outlets per circuit | = | 4 |
| Extraction fan, Air conditioner points per circuit | = | 2 |
| Stove points per circuit | = | 1 |

- When determining the number of outlets per circuit, double socket outlets count as two single socket outlets.
- In kitchens, the number of socket outlets per circuit shall be reduced to 2.
- For “maintained”-type emergency light fittings, two live wires shall be installed to the luminaire:
 - The normal, switchable, circuit
 - An unswitched circuit, for battery charging only
 - The two live wires shall originate from the same circuit breaker.
- For 20 mm or small diameter conduit only one circuit will be allowed, with the exception of the wiring from switch boards to fabricated sheet metal boxes located close to switchboards, in which case more than one circuit will be allowed. For larger conduit sizes the requirements of SANS 10142, par. 6.5.6, shall be met.

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| Volume | 1 | 2 | 3 | | | |
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- Looping and joints
 - A loop-in wiring system, where conductors are looped from outlet to outlet, shall be employed. Joints in conductors shall be avoided as far as possible, but where it becomes unavoidable, joints will be accepted in conduits. Joints shall be soldered or shall alternatively consist of approved crimped ferruling, properly covered with propriety heat-shrink sleeves. The use of PVC insulation tape is not acceptable.
- Channelled light fittings such as fluorescent fittings, shall not be used as a wireway. A t-off type draw box (dia 60mm round box, dia 60mm looping box or 100 x 50 x 50 mm wall box) shall be installed at each fitting, for circuit wiring to the relevant light fitting looping in and out.
- Grouping of conductors
 - In cases where the conductors of more than one circuit are installed in the same wireway, the conductors of each separate circuit, including the circuit earth continuity conductor, shall be grouped at intervals of at least one metre using plastic cable ties. The conductors of different circuits shall however remain separate in order to ensure that any given circuit may be withdrawn from the wireway. Conductors entering distribution boards or control boards shall be grouped and bound by means of plastic cable bands. The use of PVC insulation tape for grouping conductors will not be accepted.
- Pulling-through of conductors
 - The Contractor shall take utmost care whilst pulling conductors through conduit to ensure that the conductors are not kinked, twisted or strained in any manner. Care shall furthermore be taken to ensure that conductors do not come into contact with materials or surfaces that may damage or otherwise adversely affect the insulation and durability of the conductor.
- Earth continuity conductors
 - Only stranded copper conductors, which shall be bare or PVC insulated (coloured green/yellow), shall be used as earth continuity conductors. Although it shall be terminated such that it can fulfil this function (except where inappropriate, as will be the case of single core cable installations), under no circumstances shall the armouring and/or shielding of cables be relied upon to provide protective earth continuity.
 - When earth continuity conductors are looped between the earth terminals of equipment, the looped conductor ends shall be twisted together and then crimp ferruled or soldered to ensure that continuity is maintained, even when the conductors are removed from any earth terminal.
 - Where bare copper earth wires are specified for circuits installed in power skirting and floor ducting, the Contractor shall provide a suitable length of PVC sleeve over the bare earth conductor where it passes behind or is connected to power outlets, to ensure that such an earth conductor does not come into contact with any live parts.
 - The earth pin of dedicated socket outlets will be provided with a green/ yellow earth continuity conductor, whereas the yoke of the dedicated socket outlet shall be provided with a separate bare earth continuity conductor.
- Wiring inside vertical wireways
 - Conductors installed in vertical wireways shall be secured at intervals not exceeding 5 m to support the weight of the conductors. Approved clamps shall be supplied and installed in suitable draw-boxes for this purpose.
- Conductor sizes

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- The following minimum conductor sizes shall be used:

Table 16: Conductor sizes

| Circuit | Minimum Conductor (Size) | |
|-----------------|--------------------------|--------------------------|
| | Phase (mm ²) | Earth (mm ²) |
| Lighting | 2,5 | 2,5 |
| Socket outlet | 2,5 | 2,5 |
| Stove | 6 | 6 |
| Bell | 1,5 | 1,5 |
| Clock | 1,5 | 1,5 |
| Air conditioner | 4 | 2,5 |
| Control Wiring | 1,5 | 1,5 |

- Single pole switches
 - Single pole switches shall only be connected to the phase conductor (the neutral conductor shall NOT be switched by a single pole switch).
- Three phase outlets
 - With the exception of three phase outlets, wiring to circuits connected to different phases shall not normally be present at lighting, switch or socket outlet boxes. Where this is unavoidable, barriers shall be provided between terminals or connections of the various phases and the box shall be suitably labelled internally to indicate the presence of line voltages.
 - A separate neutral conductor shall be installed together with each three phase circuit to outlets intended for equipment connection by means of isolators or socket outlets, irrespective of whether the particular equipment may require a neutral or not.

C3.3.4.2.6.6 E100.6.6 DRAWINGS AND DOCUMENTATION

a) General

- All drawings, information, and documentation shall be in English, and each item shall be identified with:
 - The Client's name and contact details
 - Client's project / scheme / contract reference title and numbers
 - The Engineer's name and contact details
 - Engineers reference numbers
 - Contractor's works / contract / order references.
- Drawings for acceptance shall be provided on A4 or A3 paper copies as specified.

b) Drawings for Approval

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| Volume | 1 | 2 | 3 | | | |
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- The following documentation and drawings shall be submitted to the Engineer prior to the installation of cables and wireways and before civil construction have started on the areas where cable routes are required:
 - Cable route layout drawings showing
 - Type of wireways
 - Trenching
 - Cable junction boxes

c) As-built Drawings

- Detailed "as-built" drawings, clearly labelled as such, and consisting of 3 sets of drawings printed to their original size, and, where the original drawings were larger than A3, 3 sets of drawings printed (with reduced scaling, but without omitting any information from the printed area), to A3, shall be provided by the Contractor, indicating positions of the following:
 - Equipment (e.g. light fittings, draw boxes, outlets etc.)
 - Wireways (e.g. trenches, conduit, cables ladder/trays, power skirting etc.); and
 - Cable routes (including any cable joints)
 - General arrangement drawings
 - Single Line Diagrams

d) Operating and Maintenance Manual

- Three Operation Manuals, three Maintenance Manuals and three Certification copies shall be provided for all equipment supplied. The manuals shall be in A4 format.
- The operating and maintenance manuals shall include at least the following:
 - A schedule of installed components and equipment, containing the following information:
 - Manufacturers name and contact details
 - Circuit number (DB name, circuit breaker e.g. DB01-CB08); and
 - Function (e.g. switching lighting circuit DB03-L1)
 - A schedule of all installed cables, with the following information:
 - Circuit number (DB name, circuit breaker e.g. DB01-CB08)
 - Size
 - Installed length; and
 - Function (e.g. "Feeding Submersible pump IW-SP-01")
 - Description and details w.r.t:

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- Detailed description of the function of all operator controls
- Procedures for fault finding
- Maintenance instructions for all components and including repair, overhaul, change-out and installation procedures
- Inspection schedules; and
- Spare part information and recommended spares.

C3.3.4.2.6.7 E100.6.7 TESTING AND COMMISSIONING

a) General

- The installation shall be inspected and tested in accordance with SANS 10142-1.
- Inspection and testing shall only be performed by personnel with approved, current qualifications. The Contractor shall provide qualified personnel for the supervision for all inspection and testing activities.
- The Contractor shall provide all necessary safety equipment and test instruments. All test instruments shall comply with SANS 61010 and be covered by a current test and calibration certificate.
- The Contractor’s safe working arrangements shall comply with the safety management systems and procedures prevailing on site. Where there may be a risk of injury to personnel, the Contractor shall submit a risk assessment and method statement for approval, prior to starting work.
- Unless otherwise specified in the Particular Specification, all inspection and test results shall be recorded using pro-forma documentation (test certificates and schedules) complying with SANS 10142-1.
- The Contractor shall make provision for all inspection and testing activities to be witnessed. Unless otherwise specified in the Particular Specification, the period of notice for witness testing shall be 5 working days.
- Where most of the inspection and testing activities are not witnessed, the Contractor shall allow for 10% of the inspection and testing activities to be repeated for witness testing.
- If there is a requirement for additional inspection and test activities to be performed as part of process commissioning, this shall be specified in the Particular Specification.
- Unless otherwise agreed by the Employer, no part of the installation shall be commissioned until all defects or omissions revealed by inspection and testing have been rectified. Where a defect or omission renders all or part of the installation unsafe for use, the Contractor shall take approved precautions to ensure that no part of the installation can be commissioned.

b) Test Sequence

- Inspections before Testing
 - Before testing, inspections shall be performed to verify:
 - All equipment and material is of the correct type and complies with applicable SANS and IEC standards
 - All parts of the installation are correctly selected and erected

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| Volume | 1 | 2 | 3 | | | |
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- No part of the installation is visibly damaged or otherwise defective
 - The installation is suitable for the environmental conditions; and
 - The installation complies with this Specification
- Testing of Installation
- On satisfactory completion of the inspections specified in 5.2.1, the following tests shall be undertaken in the sequence listed as per SANS 10142-1:
- Continuity of conductors
 - Resistance of earthing conductor
 - Continuity of ring circuits earth fault loop impedance at main switch
 - Elevated voltage on supply neutral earth resistance
 - Insulation resistance
 - Voltage, main distribution board - no load
 - Voltage, main distribution board - on load
 - Voltage at available load
 - Operation of earth leakage units
 - Earth leakage test button
 - Polarity at points of consumption
 - Switching devices

C3.3.4.2.7 E100.7 LIGHTING

C3.3.4.2.7.1 E100.7.1 SCOPE

a) Application

- This document specifies the standard requirements for the design, installation, testing and commissioning of electrical installations operating on voltages up to 1 000 Volts AC / 1 500 Volts DC.
- The primary intention of this specification is to ensure the provision of an electrical installation, which has been designed and constructed to ensure safe, reliable, operation and to facilitate safe inspection, testing and maintenance.
- Note however that this specification only covers such installations (or sections of installations) that are covered by SANS 10142-1. Note also that certain provisions of this specification are inappropriate for direct application to installations where additional measures (such as earthing, intrinsic safe equipment, etc.) are required by SANS 10142-1 and SANS 10108 (i.e. medical and hazardous locations). For these types of installations, thorough reference must be made to the relevant statutory documentation.

b) Electrical System Characteristics

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- The design of the installation shall comply with SANS 10142-1.
- The design of the installation shall consider the following supply characteristics:
 - Voltage, frequency and number of phases
 - Maximum prospective short circuit current (phase to phase and phase to neutral)
 - Type of system, e.g. TN-S, TN-C-S
 - Maximum earth loop impedance of the earth fault path external to the installation
 - Type and rating of the cut-out or switch device
 - Load capability of the supply source, particularly the effects on the supply voltage of the starting of new equipment and any fault contributions from new equipment
- The installation protective devices shall be correctly co-ordinated within the installation and with respect to existing installations. Discrimination studies shall be performed to validate the co-ordination of the installation.
- All equipment which requires operation or attendance by a person, or requires cleaning or maintenance in service, shall be constructed and installed to allow adequate and safe means of access and working space for such activities. Similarly, the positioning of equipment shall not impede access to, or working space at, non-electrical equipment and services for operation and maintenance activities.
- The installation shall be suitable for access and use by electrically unskilled persons.
- Where additions or alterations to an existing installation are to be performed, the rating and condition of existing equipment, including that associated with the supply, shall be verified to confirm its suitability to carry any additional load. The earthing and equipotential bonding arrangements shall also be verified. No addition or alteration shall have an adverse effect on the existing installation.

C3.3.4.2.7.2 E100.7.2 STANDARDS

a) Associated Documentation

- This Specification identifies the Employer’s standard modifications and requirements which shall be applied to the statutory and recognized standards. The detailed specification of the project or site-specific requirements will be found in the Particular Specification and its accompanying Technical Data Sheets, which shall be read in conjunction with this Specification.
- Any items not specifically detailed in this Specification, which are necessary to provide a safe and fully operational working system, shall be deemed to be included.
- The Contractor shall operate an auditable quality assurance procedure covering the design, construction, inspection and testing of the installation.

b) Regulations, Specifications and Standards

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- The design, construction, inspection and testing of the installation shall comply with all relevant Statutory Regulations and Directives including:
- Occupational Health and Safety Act (Act 85 of 1993)
 - Construction Regulations 2003 issued in terms of Section 43 of the Act
 - Local Fire Regulations; and
 - Regulations and by-laws of the Local Supply Authority

and the latest editions (current at the time of Tender) of all relevant South African National Standards, as well as International Standards, including but not limited to:

Table 17 Section 7: Reference standards

| Standard Number | Description |
|-----------------|--|
| SANS 32 | Internal and/or external protective coatings for steel tubes - Specification for hot dip galvanized coatings applied in automatic plants |
| SANS 97 | Electric cables – Impregnated paper insulated metal-sheathed cables for rated voltages 3,3/3,3kV to 19/22kV (excluding pressure assisted cables) |
| SANS 121 | Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods |
| SANS 156 | Moulded-case circuit-breakers |
| SANS 164 | Two-pole and earthing-pin plugs and socket outlets |
| SANS 475 | Luminaires for interior lighting, street lighting and floodlighting - Performance requirements |
| SANS 767 | Earth leakage protection unit |
| SANS 950 | Unplasticized polyvinyl chloride rigid conduit and fittings for use in electrical installations |
| SANS 1063 | Earth rods, couplers and connections |
| SANS 1085 | Wall outlet boxes for the enclosure of electrical accessories |
| SANS 1088 | Luminaire entries and spigots |
| SANS 1091 | National colour standards of Paint |
| SANS 1195 | Busbars |
| SANS 1213 | Mechanical cable glands |
| SANS 1239 | Plugs, socket-outlets and couplers for industrial purposes |
| SANS 1266 | Ballasts for discharge lamps (excluding tubular fluorescent lamps) |
| SANS 1411 | Materials of insulated electric cables and flexible cords |
| SANS 1431 | Weldable structural steels |
| SANS 1507 | Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) |
| SANS 1700 | Fasteners |
| SANS 1777 | Photoelectric control units for lighting |
| SANS 1783 | Sawn softwood timber |
| SANS 1973 | Low-voltage switchgear and control gear Assemblies |
| SANS 2001 | Construction Works |
| SANS 10155 | Accuracy in buildings |
| SANS 10199 | The design and installation of earth electrodes |
| SANS 10225 | The design and construction of lighting masts |

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| Standard Number | Description |
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| SANS 10177 | Fire testing of materials, components and elements used in buildings Part 2: Fire resistance test for building elements |
| SANS 10142-1 | Wiring of Premises Part 1: Low Voltage Installations |
| SANS 10400 | The application of the National Building Regulations |
| SANS 60269 | Low-voltage fuses |
| SANS 60309 | Plugs, socket-outlets and couplers for industrial purposes |
| SANS 60529 | Degrees of protection provided by enclosures (IP Code) |
| SANS 60614-2 | Conduits for electrical installations - Particular specification for conduits |
| SANS 60669 | Switches for household and similar fixed-electrical installations |
| SANS 60947 | Low-voltage switchgear and control gear |
| SANS 61000 | Electromagnetic compatibility (EMC) |
| SANS 61010 | Safety requirements for electrical equipment for measurement, control, and laboratory use |
| SANS 61048 | Auxiliaries for lamps - Capacitors for use in tubular fluorescent and other discharge lamp circuits - General and safety requirements |
| SANS 61238 | Compression and mechanical connectors for power cables for rated voltages up to 30 kV (Um = 36 kV) |
| SANS 61643 | Low-voltage surge protective devices |
| Other Standards | Description |
| ARP 035 | Guidelines for the installation and maintenance of street lighting |
| BS 88 | Specification of supplementary requirements for fuses of compact dimensions for use in 240 / 415 V industrial and commercial electric installations |
| IEC 157 | Low voltage switchgear and control gear |
| IEC 408 | Low voltage air-break switches, air-break disconnectors, air-break switch disconnectors and fuse combination units |
| IEC 12373 | Aluminium and aluminium alloys. Anodizing. Method for specifying decorative and protective anodic oxidation coatings on aluminium |
| IEC 50086 | Conduit systems for cable management |
| IEC 60898 | Specification for circuit-breakers for overcurrent protection for household and similar installations |

– Standards are often tailored to the conditions of their country or origin (in terms of permissible voltages, expected ambient temperatures, etc.). Therefore, and unless normatively referenced to the contrary in a Standard of higher precedence, the decreasing order of precedence of Standards shall be:

- South African National Standards (SANS, VC, etc.)
- South African Sectoral Standards and Specifications (NERSA, CKS, ARP, NRS, PIESA, etc.)
- ISO Standards
- IEC Standards
- Harmonized British Standards (BS EN)
- Other Harmonized European National (EN) Standards (CEN, CENELEC, ETSI)
- Non-Harmonized British Standards (BS)

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- Other international standards
- Where Standards of the same order are not in agreement with each other, the Standard with the most rigorous requirements shall apply.
- The installation shall also comply with:
 - This Specification, including all technical data sheets; and
 - Any documentation issued by, or on behalf of, the Employer in respect of the Installation.

C3.3.4.2.7.3 E100.7.3 COMPONENTS AND EQUIPMENT

a) Luminaires, Control Gear and Lamps

Locally manufactured luminaires and associated accessories, control gear, lamps, test, etc. shall comply with the latest editions (current at the time of Tender) of all relevant South African National Standards, as well as International Standards, including but not limited to:

Table 18: Reference Standards for luminaires, control gear and lamps

| Standard Number | Description |
|-----------------|---|
| SANS 215 | Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment |
| SANS 890 | Ballasts for fluorescent lamps |
| SANS 891 | Reference ballasts for class B fluorescent lamps |
| SANS 1041 | Tubular fluorescent lamps for general service |
| SANS 1266 | Ballasts for discharge lamps (excluding tubular fluorescent lamps) |
| SANS 1464-22 | Safety of luminaires- Part 22: Luminaires for emergency lighting |
| SANS 1662 | Self-ballasted LED tubular lamps for general lighting services of > 50 V — Safety requirements |
| SANS 1664: | Semi-luminaires for T5 fluorescent lamps — Safety requirements |
| SATS 1706 | UVGI luminaires — Safety and performance requirements |
| SANS 1814 | D.C. supplied luminaires for fluorescent lamps |
| SANS 10114 | Interior lighting |
| SANS 10389 | Exterior lighting |
| SANS 17576 | Light-emitting diode products for interior lighting, streetlighting and floodlighting - Performance requirement |
| SANS 50285 | Energy efficiency of electric lamps for household use - Measurement methods |
| SANS 60064 | Tungsten filament lamps for domestic and similar general lighting purposes - Performance requirements |
| SANS 60188 | High-pressure mercury vapour lamps - Performance specifications |
| SANS 60192 | Low-pressure sodium vapour lamps - Performance specifications |
| SANS 60079 | Explosive atmospheres- Parts 14 and 17 |
| SANS 60155 | Glow-starters for fluorescent lamps |
| SANS 60238 | Edison screw lamp holders |
| SANS 60399 | Barrel thread for lamp holders with shade holder ring |
| SANS 60400 | Lamp holders for tubular fluorescent lamps and starter holders |
| SANS 60432 | Incandescent lamps- Parts 1 to 3 |

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| Standard Number | Description |
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| SANS 60570 | Electrical supply track systems for luminaires |
| SANS 60598-1 | Luminaires- Part 1: General requirements and tests |
| SANS 60662 | High-pressure sodium vapour lamps |
| SANS 60598-2 to 25 | Luminaires- Part 2-1 to Part 2-25 |
| SANS 60730-2-3 | Automatic electrical controls for household and similar use Part 2-3: Particular requirements for thermal protectors for ballasts for tubular fluorescent lamps |
| SANS 60838-1 | Miscellaneous lamp holders Part 1: General requirements and tests |
| SANS 60901 | Single-capped fluorescent lamps - Performance specifications |
| SANS 60921 | Ballasts for tubular fluorescent lamps - Performance requirements |
| SANS 60923 | Auxiliaries for lamps - Ballasts for discharge lamps (excluding tubular fluorescent lamps) - Performance requirements |
| SANS 60925 | DC supplied electronic ballasts for tubular fluorescent lamps - Performance requirements |
| SANS 60927 | Auxiliaries for lamps - Starting devices (other than glow starters) - Performance requirements |
| SANS 60929 | AC and/or DC-supplied electronic control gear for tubular fluorescent lamps - Performance requirements |
| SANS 60968 | Self-ballasted lamps for general lighting services - Safety requirements |
| SANS 60969 | Self-ballasted lamps for general lighting services — Performance requirements |
| SANS 61047 | DC or AC supplied electronic step-down convertors for filament lamps - Performance requirements |
| SANS 61048 | Auxiliaries for lamps - Capacitors for use in tubular fluorescent and other discharge lamp circuits - General and safety requirements |
| SANS 61049 | Capacitors for use in tubular fluorescent and other discharge lamp circuits - Performance requirements |
| SANS 61195 | Double-capped fluorescent lamps - Safety specifications |
| SANS 61199 | Single-capped fluorescent lamps - Safety specifications |
| SANS 61347 | Lamp control gear |
| SANS 61547: | Equipment for general lighting purposes — EMC immunity requirements |
| SANS 61549 | Miscellaneous lamps |
| SANS 61195 | Devices for the connection of luminaires for household and similar purposes- Parts 1 and 2 |
| SANS 61231 | International lamp coding system (ILCOS) |
| SANS 62031 | LED modules for general lighting — Safety specifications |
| SANS 62034 | Automatic test systems for battery powered emergency escape lighting |
| SANS 62035 | Discharge lamps (excluding fluorescent lamps) - Safety specifications |
| SANS 62386 | Digital addressable lighting interface- Parts 101 to 103 and Parts 201 to 210 |
| SANS 62442 | Energy performance of lamp control gear |
| SANS 62504 | General lighting — Light emitting diode (LED)- products and related equipment — Terms and definitions |
| SANS 62532 | Fluorescent induction lamps - Safety specifications |

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| Standard Number | Description |
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| SANS 62560 | Self-ballasted LED-lamps for general lighting services by voltage > 50 V - Safety specification |
| SANS 62612 | Self-ballasted LED lamps for general lighting services with supply voltages > 50 V - Performance requirements |
| SANS 62733 | Programmable components in electronic lamp control gear- General and safety requirement |
| SANS 62838 | LEDsi lamps for general lighting services with supply voltages not exceeding 50 V a.c. r.m.s. or 120 V ripple free d.c. - Safety specifications |

– Luminaires

- Luminaires shall be delivered within 12 months from being manufactured and shall be delivered to site unused with protective wrappings.
- Luminaires shall be delivered, stored and handled in accordance with the manufacturer's instructions. Where the performance of the luminaire is likely to be adversely affected, all necessary preventative precautions shall be undertaken.
- Luminaires shall be protected against mechanical damage.
- Upon the Engineer's request, electronic photometric data files shall be made available for each luminaire. These files shall be suitable for lighting simulation software such as Relux and Dialux.
- Luminaires to be connected to 6A socket outlets, such as recessed luminaires, shall be provided with 3m long cords, complete with moulded 6A plug top (cord-set).
- If required by the Employer, a sample of every luminaire offered shall be submitted to the Employer for approval. Acceptance of the samples by the Employer shall not place the Employer under any obligation.
- The contractor shall forward SANS 60598 compliant type-test certificates of luminaires, to the Engineer upon request.
- All imported luminaires shall through the Letter of Authority Process by the NRCS adhere to the relevant SANS requirements, as set out by the Compulsory Specification VC 8055.

– Control Gear and Enclosures

- High frequency, electronic control gear shall be used for tubular (double capped) and compact (single capped) fluorescent lamps, and, where appropriate, for discharge lamps. Electromagnetic control gear may not be used, unless no other alternative is available.

– Lamps

- All luminaires shall be supplied complete with lamps.
- All lamps of a specific type shall be of the same manufacturer.
- All fluorescent type discharge lamps shall be colour 840, unless otherwise specified.

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| Volume | 1 | 2 | 3 | | | |
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- All metal halide lamps shall be “natural daylight” colour, unless otherwise specified.
- All LED’s shall have a colour temperature of 4000K, unless otherwise specified.
- A service call shall be done on all lamps, ten working days before expiry of the manufacturer’s guarantee period.

c) Switches

– Flush mounted switches

- Flush mounted switches shall comply with SANS 60669-1 and shall bear the SABS mark.
- All flush mounted switches shall be suitable for mounting in 100 x 50 x 50 mm galvanised steel or PVC wall boxes. “Open-back” type wall boxes will not be accepted.
- The switch mechanism shall be of the tumbler-operated micro-gap type with silent operation, and shall be rated for 16 A continuous loading at 50 Hz and 250 V.
- Switches shall have protected terminals for safe wiring. Multi-lever switches shall be constructed so as to enable individual defective switches to be removed and replaced without having to remove the remaining switches.
- The mounting holes provided on the yoke strap shall be slotted to allow for easy alignment. A brass earthing terminal shall furthermore be provided on the yoke to ensure the positive earthing of the switch assembly.
- Cover plates for flush mounted switches shall have levelled edges which overlap the wall box in order to conceal all wall imperfections.

– Surface mounted switches

- Surface mounted switches shall comply with SANS 60669-1 and shall bear the SABS mark.
- Surface mounted switches shall consist of single or multiple switches, not exceeding four, and shall be mounted in a pressed steel box of heavy duty construction.
- The switch mechanism shall be of the tumbler operated micro-gap type with silent operation and shall be rated for 16A continuous loading at 250V and 50Hz.
- A brass earthing terminal shall furthermore be provided on the switch construction to ensure the positive earthing of the switch assembly and enclosure.
- The covers of surface mounted switches shall have toggle protectors.

– Photo-Electric daylight switches

- The unit shall comprise a photo-cell, thermal actuator and change-over switch. The cover of the unit shall be manufactured from a tough, durable material providing protection against tampering. The cover shall have good weathering properties. It shall be ultraviolet resistant and shall not deteriorate when exposed to sunlight for prolonged periods.
- The units shall be capable of operating in dusty conditions, and over an ambient temperature range - 15°C to + 55°C.

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- The units shall be designed to withstand damage by hail and stones thrown by vandals. If the units do not possess this quality, separate wire screens shall be provided for this purpose.
 - All parts shall be treated to be corrosion-proof.
 - The operation level shall be factory pre-set for "ON" at a light level of 60 lux and "OFF" at 90 lux, with a permissible deviation of 12 lux either way. Voltage variations shall not materially affect the operational levels.
 - A time delay, of not less than 15 seconds, shall be provided to prevent the unit from functioning due short-duration changes in illumination, such as lightning.
 - The unit shall be effectively safeguarded against voltage surges by means of a suitable surge protector, which shall preferably form an integral part of the unit.
 - The unit shall be of the wall mounting type and shall be supplied complete with a suitable bracket.
 - The change-over switch shall be capable of switching 10A AC at 250V.
 - The unit shall be mounted inside an IP65 enclosure. The enclosure shall have a transparent lid.
- Dimmer modules
- Dimmer modules shall comply with SANS 60929.
 - Units shall be rated at 250V, and capable of powering inductive (minimum power factor of 0.65 lagging) and capacitive (minimum power factor of 0.75 leading) loads.
 - The efficiency of modules may not be less than 95%, and the harmonic current injection not more than 1% THD, at full load (where such load is resistive).
 - Furthermore, the units shall be provided with automatic over-temperature, over-current and short-circuit cut-out features. Where over-current of short duration is expected (i.e. luminaire starting current), over-current protection may be by way of self-regulation (i.e. a reduction in output voltage).
 - Dimmer modules shall be sound-attenuated, such that audible noise is limited to 30dB (all weightings) measured at a distance of 1 m from the module.
 - The output of modules shall be controlled by propriety pushbutton-type switches. An additional switch, located in the same enclosure as the pushbutton, shall be provided for switching the input to the dimmer module.
 - Unless prior approval in this regard has been gained from the Engineer, dimmer modules may not be paralleled.
 - Dimmer modules shall be selected and installed such that 30% spare capacity will be available for future additions to the output circuitry.
- Occupancy sensors
- Occupancy (also referred to as motion or vacancy sensors), shall be installed in accordance with the manufacturer's requirements and specification.
 - Sensors shall adhere to the latest amendment of IEC 62386-303: Digital addressable lighting interface - Part 303: Particular requirements – Input devices – Occupancy sensor.

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- Surface mounted sensors on ceilings, shall be screw fixed to a round box installed on the inside of the ceiling.
- Where sensors are part of a surface mounted installed, such as against a soffit of a concrete slab, it shall be mounted on a 100 x 100 mm draw box fixed on a blanking plate.
- Sensors shall be selected to carry the full load of the circuit, with 30% spare capacity for future expansion. When selecting the sensor, the high start-up current of some lamps as well as LED's, shall be taken into account.
- Sensors shall be positioned optimally for its application. Cognisance shall be taken of the following:
 - The mode of occupancy of the relevant area
 - Sensing range
 - Position sensors away from air ducts and windows
 - Direction of motion
 - Any obstructions by future furniture/ equipment
 - When obstruction is problematic, sensors with infrared detection shall not be used. Technology such as active microwave or ultrasonic sensors shall be installed.
- Sensors shall be adjusted optimally, as part of the testing and commissioning procedure. The following items shall be set:
 - Sensing range
 - Daylight harvesting lux adjustment
 - Delay time

C3.3.4.2.7.4 E100.7.4 INSTALLATION OF COMPONENTS AND EQUIPMENT

a) Installation of Lighting and Accessories

– Mounting of light fittings

- Surface mounted down light holders, such as the bayonet / screw-in type lamp holders used for incandescent fittings, shall be screwed to the ceiling by means of at least two 4 mm diameter self-tapping screws. Plastic expansion plugs, of good quality, are to be used where the surface is concrete, plaster or brick. For suspended and soft ceilings, a solid timber backing strip of at least 40 x 40 mm timber must be supplied and installed between supports, with the screws fixed to these backing strips.
- Channelled fittings, such as fluorescent fittings, shall be firmly mounted to ensure close contact with the ceiling over the entire length of the fitting. On concrete slabs the fittings shall be mounted by means of two screws into the ceiling conduit box, as well as two round-headed 6 mm x 40 mm electroplated self-tapping screws and plastic expansion plugs, one at either end. Where fittings are to be installed underneath suspended ceilings, they shall be mounted in an equal manner, but timber backing strips of at least 40 x 40 x 450 mm (at both ends) shall be placed in position on top of the ceiling board and the end screws secured to these strips, such that the weights of the fittings distribute evenly.

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- Channelled light fittings fixed to P2000 type trunking, shall be fixed to the trunking by means of a “fluorescent adaptor” specifically designed for this purpose. Wiring to and from the light fitting shall pass through this adaptor.
- Channelled light fittings such as fluorescent fittings, shall not be used as a wireway. A t-off type draw box (dia 60mm round box, dia 60mm looping box or 100 x 50 x 50 mm wall box) shall be installed at each fitting, for circuit wiring to the relevant light fitting looping in and out.
- Flat-back type wall mounted light fittings (such as bulkhead light fittings) shall be fixed to walls by means of two round-headed 6 mm x 40 mm electroplated self-tapping screws and plastic expansion wall plugs. The light fitting shall be positioned with the rear entry facility for wiring directly over a diameter 60mm flush round box.
- Positions of recessed down lights shall be set out for the ceiling contractor to cut the openings for the lights. Manufacturers recommended cut-out sized shall be communicated to the ceiling contractor.
- Recessed fluorescent light fittings, for installation in suspended ceiling grids shall be properly installed and seated in the relevant openings. Recessed fluorescent light fittings shall not be obstructed by any building elements such as partition walls.
- To ensure the safety of people below, where fittings are clamped or bolted directly to trusses or other building elements (as in the case of some high bay and floodlight installations) they shall be provided with an additional safety chain or safety cable of appropriate corrosion-proof material. This safety cable / safety chain assembly shall be connected independently of the luminaire-supporting clamps or bolts, such that either assembly can be loosened and removed without affecting the other. The safety assemblies shall have a load safety factor not less than 3.
- In the case where control gear is not part of the luminaire, it shall be installed adjacent to the light fitting. The control gear shall be provided with the same cable / safety chain assembly, as mentioned in item h) above.
- Specialized light fittings (i.e. types of fittings not mentioned in this specification) must be installed strictly in accordance with their manufacturer’s requirements and guidelines.

C3.3.4.2.7.5 E100.7.5 DRAWINGS AND DOCUMENTATION

a) General

- All drawings, information, and documentation shall be in English, and each item shall be identified with:
 - i) The Client’s name and contact details
 - ii) Client’s project / scheme / contract reference title and numbers
 - iii) The Engineer’s name and contact details
 - iv) Engineers reference numbers
 - v) Contractor’s works / contract / order references.
- Drawings for acceptance shall be provided on A4 or A3 paper copies as specified.

b) Drawings for Approval

- The following documentation and drawings shall be submitted to the Engineer prior to the installation of cables and wireways and before civil construction have started on the areas where cable routes are required:
 - i) Cable route layout drawings showing:

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- Type of wireways
- Trenching
- Cable junction boxes

c) As-built Drawings

- Detailed “as-built” drawings, clearly labelled as such, and consisting of 3 sets of drawings printed to their original size, and, where the original drawings were larger than A3, 3 sets of drawings printed (with reduced scaling, but without omitting any information from the printed area), to A3, shall be provided by the Contractor, indicating positions of the following:

- i) Equipment (e.g. light fittings, draw boxes, outlets etc.)
- ii) Wireways (e.g. trenches, conduit, cables ladder/trays, power skirting etc.); and
- iii) Cable routes (including any cable joints)
- iv) General arrangement drawings
- v) Single Line Diagrams

d) Operating and Maintenance Manual

- Three Operation Manuals, three Maintenance Manuals and three Certification copies shall be provided for all equipment supplied. The manuals shall be in A4 format.

- The operating and maintenance manuals shall include at least the following:

i) A schedule of installed components and equipment, containing the following information:

- ii) Manufacturers name and contact details
- iii) Circuit number (DB name, circuit breaker e.g. DB01-CB08); and
- iv) Function (e.g. switching lighting circuit DB03-L1)

b) A schedule of all installed cables, with the following information:

- i) Circuit number (DB name, circuit breaker e.g. DB01-CB08)
- ii) Size
- iii) Installed length; and
- iv) Function (e.g. “Feeding Submersible pump IW-SP-01”)

c) Description and details w.r.t:

- i) Detailed description of the function of all operator controls
- ii) Procedures for fault finding
- iii) Maintenance instructions for all components and including repair, overhaul, change-out and installation procedures
- iv) Inspection schedules; and
- v) Spare part information and recommended spares

C3.3.4.2.6.7 E100.6.7 TESTING AND COMMISSIONING

a) General

- The installation shall be inspected and tested in accordance with SANS 10142-1.
- Inspection and testing shall only be performed by personnel with approved, current qualifications. The Contractor shall provide qualified personnel for the supervision for all inspection and testing activities.
- The Contractor shall provide all necessary safety equipment and test instruments. All test instruments shall comply with SANS 61010 and be covered by a current test and calibration certificate.

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- The Contractor's safe working arrangements shall comply with the safety management systems and procedures prevailing on site. Where there may be a risk of injury to personnel, the Contractor shall submit a risk assessment and method statement for approval, prior to starting work.
- Unless otherwise specified in the Particular Specification, all inspection and test results shall be recorded using pro-forma documentation (test certificates and schedules) complying with SANS 10142-1.
- The Contractor shall make provision for all inspection and testing activities to be witnessed. Unless otherwise specified in the Particular Specification, the period of notice for witness testing shall be 5 working days.
- Where most of the inspection and testing activities are not witnessed, the Contractor shall allow for 10% of the inspection and testing activities to be repeated for witness testing.
- If there is a requirement for additional inspection and test activities to be performed as part of process commissioning, this shall be specified in the Particular Specification.
- Unless otherwise agreed by the Employer, no part of the installation shall be commissioned until all defects or omissions revealed by inspection and testing have been rectified. Where a defect or omission renders all or part of the installation unsafe for use, the Contractor shall take approved precautions to ensure that no part of the installation can be commissioned.

b) Test Sequence

- Inspections before Testing
 - Before testing, inspections shall be performed to verify:
 - All equipment and material is of the correct type and complies with applicable SANS and IEC standards
 - All parts of the installation are correctly selected and erected
 - No part of the installation is visibly damaged or otherwise defective
 - The installation is suitable for the environmental conditions; and
 - The installation complies with this Specification
- Testing of Installation
- On satisfactory completion of the inspections specified in 5.2.1, the following tests shall be undertaken in the sequence listed as per SANS 10142-1:
 - Continuity of conductors
 - Resistance of earthing conductor
 - Continuity of ring circuits earth fault loop impedance at main switch
 - Elevated voltage on supply neutral earth resistance
 - Insulation resistance
 - Voltage, main distribution board - no load
 - Voltage, main distribution board - on load
 - Voltage at available load
 - Operation of earth leakage units
 - Earth leakage test button
 - Polarity at points of consumption
 - Switching devices

C3.3.4.2.8 E100.8 STREET AND AREA LIGHTING

C3.3.4.2.8.1 E100.8.1 SCOPE

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a) Application

- This document specifies the general requirements and related tests for Street and Area Lighting. It covers the classification, marking, mechanical and electrical construction of luminaires, poles and high masts.
- Installation Performance Requirements
- The installation shall be suitable for its intended duty with respect to the operating conditions of the electrical system and the electrical load requirements.
- The installation shall be suitable for the environmental conditions, particularly with respect to corrosion resistance and ingress protection.

C3.3.4.2.8.2 E100.8.2 STANDARDS

a) Associated Documentation

- This Specification identifies the Employer’s standard modifications and requirements which shall be applied to the statutory and recognized standards. The detailed specification of the project or site-specific requirements will be found in the Particular Specification and its accompanying Technical Data Sheets, which shall be read in conjunction with this Specification.
- Any items not specifically detailed in this Specification, which are necessary to provide a safe and fully operational working system, shall be deemed to be included.
- The Contractor shall operate an auditable quality assurance procedure covering the design, construction, inspection and testing of the installation.

b) Regulations, Specifications and Standards

- The design, construction, inspection and testing of the installation shall comply with all relevant Statutory Regulations and Directives including:
 - Occupational Health and Safety Act (Act 85 of 1993)
 - Construction Regulations 2003 issued in terms of Section 43 of the Act
 - Local Fire Regulations; and
 - Regulations and by-laws of the Local Supply Authority

and the latest editions (current at the time of Tender) of all relevant South African National Standards, as well as International Standards, including but not limited to:

Table 19 Section 8: Reference standards

| Standard Number | Description |
|-----------------|---|
| SANS 32 | Internal and/or external protective coatings for steel tubes - Specification for hot dip galvanized coatings applied in automatic plants |
| SANS 97 | Electric cables – Impregnated paper insulated metal-sheathed cables for rated voltages 3,3/3,3kV to19/22kV (excluding pressure assisted cables) |
| SANS 121 | Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods |

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| Standard Number | Description |
|------------------------|---|
| SANS 156 | Moulded-case circuit-breakers |
| SANS 164 | Two-pole and earthing-pin plugs and socket outlets |
| SANS 475 | Luminaires for interior lighting, street lighting and floodlighting - Performance requirements |
| SANS 767 | Earth leakage protection unit |
| SANS 950 | Unplasticized polyvinyl chloride rigid conduit and fittings for use in electrical installations |
| SANS 1063 | Earth rods, couplers and connections |
| SANS 1085 | Wall outlet boxes for the enclosure of electrical accessories |
| SANS 1088 | Luminaire entries and spigots |
| SANS 1091 | National colour standards of Paint |
| SANS 1195 | Busbars |
| SANS 1213 | Mechanical cable glands |
| SANS 1239 | Plugs, socket-outlets and couplers for industrial purposes |
| SANS 1266 | Ballasts for discharge lamps (excluding tubular fluorescent lamps) |
| SANS 1411 | Materials of insulated electric cables and flexible cords |
| SANS 1431 | Weldable structural steels |
| SANS 1507 | Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) |
| SANS 1700 | Fasteners |
| SANS 1777 | Photoelectric control units for lighting |
| SANS 1783 | Sawn softwood timber |
| SANS 1973 | Low-voltage switchgear and control gear Assemblies |
| SANS 2001 | Construction Works |
| SANS 10155 | Accuracy in buildings |
| SANS 10199 | The design and installation of earth electrodes |
| SANS 10225 | The design and construction of lighting masts |
| SANS 10177 | Fire testing of materials, components and elements used in buildings Part 2: Fire resistance test for building elements |
| SANS 10142-1 | Wiring of Premises Part 1: Low Voltage Installations |
| SANS 10400 | The application of the National Building Regulations |
| SANS 60269 | Low-voltage fuses |
| SANS 60309 | Plugs, socket-outlets and couplers for industrial purposes |
| SANS 60529 | Degrees of protection provided by enclosures (IP Code) |
| SANS 60614-2 | Conduits for electrical installations - Particular specification for conduits |
| SANS 60669 | Switches for household and similar fixed-electrical installations |
| SANS 60947 | Low-voltage switchgear and control gear |
| SANS 61000 | Electromagnetic compatibility (EMC) |
| SANS 61010 | Safety requirements for electrical equipment for measurement, control, and laboratory use |
| SANS 61048 | Auxiliaries for lamps - Capacitors for use in tubular fluorescent and other discharge lamp circuits - General and safety requirements |
| SANS 61238 | Compression and mechanical connectors for power cables for rated voltages up to 30 kV (Um = 36 kV) |
| SANS 61643 | Low-voltage surge protective devices |
| Other Standards | Description |

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| Standard Number | Description |
|-----------------|---|
| ARP 035 | Guidelines for the installation and maintenance of street lighting |
| BS 88 | Specification of supplementary requirements for fuses of compact dimensions for use in 240 / 415 V industrial and commercial electric installations |
| IEC 157 | Low voltage switchgear and control gear |
| IEC 408 | Low voltage air-break switches, air-break disconnectors, air-break switch disconnectors and fuse combination units |
| IEC 12373 | Aluminium and aluminium alloys. Anodizing. Method for specifying decorative and protective anodic oxidation coatings on aluminium |
| IEC 50086 | Conduit systems for cable management |
| IEC 60898 | Specification for circuit-breakers for overcurrent protection for household and similar installations |

C3.3.4.2.8.3 E100.8.3 LUMINAIRES

a) General

- Luminaires shall be delivered within 12 months from being manufactured and shall be delivered to site unused with protective wrappings.
- Luminaires shall be delivered, stored and handled in accordance with the manufacturer's instructions. Where the performance of the luminaire is likely to be adversely affected, all necessary precautions shall be undertaken.
- They shall be protected against mechanical damage.
- Samples
- If required by the Employer, a sample of every luminaire offered shall be submitted to the Employer for approval. Acceptance of the samples by the Employer shall not place the Employer under any obligation.

b) Classification

- All luminaires shall have been type tested to SANS 60598-1 and 60598-2-3 by a SABS-approved certification authority (Contractor to furnish test certificates to the Engineer upon request to do so)
- All luminaires shall be of the totally enclosed type. Luminaires shall be adequately and securely fixed to the pole or bracket, allowing for adjustments and when adjusted shall be fixed and remain locked in the set position. Spigot entries shall comply with Table 1 of SANS 1088.
- Luminaires shall be constructed to inhibit the ingress of dirt, moisture and insects. The minimum IP rating for the lamp and control gear compartments shall be IP 65. IP rating shall comply with SANS/IEC 60529.
- All luminaires shall comply with the recommendations and references of Chapter 4 of ARP 035.

c) Marking

- Self-adhesive labels indicating the type and wattage of the lamp shall be stuck to the underside of the luminaire housing and shall be visible when the luminaire is mounted on a pole. Luminaires suitable for use with tubular lamps shall be indicated as such, with the letter "T" and luminaires for elliptical lamps with the letter "E", after the wattage. Letters shall be at least 40 mm in height and be black against the following background colours:

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Table 20: Background colours to labels

| Lamp | Colour |
|------------------------------|--------|
| High pressure sodium vapour | orange |
| High pressure mercury vapour | blue |
| Metal halide | green |

d) Construction

- The housing shall be robustly constructed, weatherproof, hail proof, corrosion proof and vandal resistant. It shall be manufactured from filled ultraviolet stabilized engineering polymer, aluminium or dough moulding compound (DMC).
- The diffuser shall be constructed from injection moulded high impact acrylic or otherwise toughened heat and impact resistant glass and shall not accumulate dirt reducing the light output. Polycarbonate shall not be used as it discolours and loses its impact resistance when exposed to the UV emitted by the sun or the light source.
- Luminaires with a sealed optical compartment allowing lamp replacement from above, which does not require opening the diffuser bowl for lamp replacement, shall be preferred. If the diffuser has to be opened for lamp replacement, the diffuser shall be held in place by stainless steel clips, ensuring the diffuser is closed even if one clip is broken. The diffuser shall remain attached to the housing when opened for maintenance or lamp replacement.
- A silicon rubber gasket shall be used to seal the lamp compartment. It shall be fitted into a groove in the housing and be kept in place to ensure the integrity of the IP rating. Neoprene or felt gaskets shall not be acceptable.
- An exterior lip shall be provided on the housing to ensure that there is no direct rainwater contact with the gasket between the housing and the diffuser, thus ensuring that no moisture is sucked into the diffuser when the luminaire is switched off and cools down.
- Anodized aluminium shall be used for a reflecting material, and the anodizing process shall comply with the requirements of BS 1615. The plate shall be thick enough not to become warped or distorted by the heat coming from the lamp. The reflector shall be permanently fitted into the housing. Luminaires shall preferably be of the semi-cut-off (SCO) distribution, unless the design requires a cut-off (CO) distribution. The luminaires shall be marked with the type of light distribution.
- If a luminaire has an adjustable light distribution, either by setting of the optical system, or orientation of reflectors or of the lamp-holder, adjustment markings shall be provided on the luminaire body, and information shall be provided by the manufacturer on the light distribution classification for each setting. The marking shall be made in a clear and indelible manner.
- The lamp-holder shall comply with VC 8011, shall be rated for 240 °C and shall not be susceptible to possible loosening of the lamp caused by vibrations. The lamp-holder and end caps shall be made of porcelain, having silver plated metal parts being of the GES type and able to withstand the high starting voltage. The centre contact of the lamp-holder shall be spring loaded and shall not deteriorate under normal working conditions.
- All control gear shall be housed within the body of the luminaire in a separate gear compartment sealed with a hinged, non-corrosive lid. Covers and other parts that provide protection against electric shock shall have adequate mechanical strength and shall be reliably secured so that they will not work loose whilst in service. For ease of maintenance, all control gear components shall be mounted on a removable gear tray. Luminaires that

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have a sealed optical compartment, with lamp replacement from above, shall also have a control gear compartment accessible from above.

- The control gear shall be removable and suitable for operation with the specified rating of the lamp on a 230 V ± 10% 50 Hz single-phase system. All internal wiring shall be protected against abrasion and heat, by using appropriate insulation or sleeve. All screws, bolts and metal parts shall be of stainless steel or non-corrosive materials.
- Lamp capacitors shall be manufactured fully in accordance with SANS 1250-1979 and shall be designed when used with the lamp and ballast provided to improve the overall power factor to at least 0.95 lagging. Capacitors shall be fitted with safety discharged resistors and shall be provided with approved nameplates setting out the details of the capacitors.
- Lamp ballasts shall comply with the requirements of SANS 1266 and shall be rated for the service required of them and shall be suitable for use with the lamps specified. Ballasts shall be of the totally encapsulated type having terminal blocks for ease of maintenance. The ballasts shall be provided with approved nameplates setting out the particulars of the ballast. The electronic ignition device shall be of the three wire type operating on the superposed pulse principle. The circuiting shall be such that shall a lamp fail the ignition shall not continue pulsing.

e) Area (Flood) Lights

- The luminaires shall be of the totally enclosed weatherproof type complete with a suitable lamp with integral mounted igniter and control gear.
- The housing shall be robustly constructed of die cast LM6 aluminium alloy or other corrosion proof and UV resistant material and be effectively sealed to inhibit the ingress of dirt, moisture and insects
- The front glass cover shall be constructed from heat resistant armoured glass having retaining clips, fasteners, etc., manufactured from stainless or ferritic steel. The fitting shall incorporate a protractor scale to allow for the correct and accurate adjustment of the downward to vertical aiming angle.
- The internal wiring shall be by means of high temperature grade silicone rubber insulated high quality flexible stranded cables not subject to deterioration. The low voltage wiring shall not be less than 660 volt grade and in the case of high voltage wiring the continuous voltage grade must be suitable for the open circuit voltage of the ballast.
- The compartment in which the control gear is located shall be accessible to provide ease of maintenance. This compartment shall be complete with earthing terminal and 660 volts insulated line connector block.
- Capacitors shall be metal clad, totally enclosed type complete with sealed in cable tails. Capacitors shall be manufactured fully in accordance with SANS 1250 and be capable of improving the overall power factor to at least 0.95 and be fitted with safety discharged resistors.
- Chokes shall be of the totally encapsulated type having terminal blocks for ease of maintenance.
- The electronic ignition device shall be of the three wire type operating on the superposed pulse principle.
- The circuiting shall be such that shall a lamp fail the ignition shall not continue pulsing.
- The lamp-holder end cap shall be porcelain, having silver plated metal parts being of the GES type and able to withstand the high starting voltage. The lamp-holder shall incorporate a spring wire type supporting device at the end of the lamp opposite the cap.

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C3.3.4.2.8.4 E100.8.4 STREETLIGHT AND AREA LIGHTING POLES

a) General

- All poles shall be designed to withstand all static and dynamic loads on the fully equipped pole.
- Lighting columns shall be installed according to with the ARP 035.
- Unless otherwise specified poles having a luminaire mounting height less than 11,5 m shall be of glass filament wound (GRP) manufacture; poles having a luminaire mounting height more than 11,5 m shall be of steel.

b) Design parameters

- All poles shall comply with SANS 10225, under the following requirements:
 - Terrain category : 3
 - Design wind speed : 144 km/h
 - Altitude (above sea level) : 1000 m
 - Minimum safety factor : 1.5
- The horizontal and vertical deflections shall not exceed the requirements of SANS 10225.

c) Poles for streetlights

- The streetlight poles shall be manufactured from either steel or glass filament wound polyester and shall be of the round cross-section (tubular) tapered type. The poles shall have a luminaire mounting height as specified in the particular specification with or without a single or double outreach.
- The spigot for the mounting of the luminaire on the outreach arm shall be round with an external diameter of 40 mm and a length of 100 mm. The spigots shall be such that when the luminaires are mounted, they shall be at an angle of 15° to the horizontal or as otherwise specified.

d) Poles for area lighting

- The poles for the area lighting shall be manufactured from either steel or glass filament wound polyester and shall be of the straight round cross-section tapered type. The poles shall be suitable for the mounting of post top type luminaires at a mounting height as specified in the detail specification.
- The spigot for the mounting of the luminaire shall be round with an external diameter of 75 mm and shall have a length of 100 mm.

e) Cable entries

- The poles shall be provided with a cable access opening suitable for installing at least three 16 mm², 4-core street lighting cables.
- The edges of the access opening shall be smooth to prevent any damage to the cables.
- The access opening shall be positioned such that the opening is at least 500 mm below ground level after the pole has been erected.

f) Access Aperture

- At a height of at least 600 mm above ground level an opening, 240 mm high by 80 mm wide, shall be provided on the poles. The opening shall be covered with a weatherproof cover

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plate with a profile similar to that of the pole. The cover plate shall be manufactured from the same material as that of the pole and the thickness thereof shall not be less than that of the pole. The cover plate shall be fixed to the pole by 10 mm hexagonal brass nuts.

- A mounting plate suitable for mounting equipment shall be fixed to the pole on the inside of the access opening. A clip tray / DIN-rail for two circuit breakers, a clip tray for four "Clip-on" type terminal blocks and a gland plate to take up to three cables shall be installed on the mounting plate. A 10 mm earth stud of adequate length shall be either installed on the mounting plate or shall be welded on the inside of the pole.
- The pole shall be fully equipped with the low voltage equipment specified in the detail specification.

g) Pole baseplates

- Each of the poles shall be provided with a steel baseplate with a diameter of at least 350 mm and a thickness not less than 4 mm.
- The baseplates shall be supplied complete with hook bolts and fasteners.

h) Finishing

- Steel poles
 - All welding on steel poles shall be smooth and neat in accordance with SANS 10225. No splatter, slag or blister shall be visible.
 - All parts of the streetlight pole, including cross-arms shall be hot dip galvanised in accordance with SANS 32 and SANS 121 and test certificates shall be provided if required. No welding, drilling, punching, bending or removal of burrs shall be carried out after galvanising.
 - For added protection against corrosion the pole shall be dipped in tar up to 500 mm above the finished ground level.
- Glass filament wound polyester poles
 - The pole shall be constructed by the filament winding process to achieve optimum results for strength and rigidity. The filament winding process shall be continuously applied with uniform tension onto a rotating mandrel and shall result in a minimum mass glass to resin ratio of 70:30. The surface shall be seamless, smooth and tapered.
 - The material of the finishing coat shall be a gel coat that shall comply with the requirements of SANS 141 and shall be applied to a uniform thickness of between 250 and 500 microns. It shall provide a weatherproof, UV resistant, and flame-resistant and impact strong surface in the colour specified.
 - The pole shall be manufactured in accordance with SANS 1749 under the ISO 9002 quality system and shall bear the applicable mark.
 - If an access opening is required, the cut-out shall be covered by an access door cover manufactured from glass filled nylon impregnated in the same colour as that of the surface coat. It shall be secured to the pole by two stainless steel Allen head captive screws into M4 brass inserts embedded in the pole.
- Concrete
 - Spun reinforced concrete poles shall be manufactured in accordance with SANS 470.

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- Wood
 - SANS 754 eucalyptus trees and SANS 753 pine trees comprises the specification for wooden poles used for electrical reticulation including streetlights.

C3.3.4.2.8.5 E100.8.5 HIGH MAST LIGHTING

i) General

- The mast shall be of octagonal cross section, tapered, with the mounting height of the luminaires specified in the detail specification. The mast shall be designed to SANS 10225 Code of Practice and when fully equipped with the luminaires shall withstand a wind velocity appropriate to the site conditions. The deflection at the top of the mast shall not exceed 2.5% of the mast height when subjected to two thirds of the maximum wind velocity.
- The masts shall be designed for mounting on a reinforced concrete foundation by means of a base plate secured to bolts casted into the foundation. Additional gussets shall be provided between the base plate and the mast. No steel used in the construction of the mast shall be less than 5 mm in thickness and all steel shall comply with the requirements of BS 4360 grade 43A.
- An aperture shall be provided on the side of the mast base compartment to afford ample and easy access to the equipment installed therein. The opening shall be fitted with a lockable, close fitting cover fully sealed against the weather. The perimeters of the opening shall be reinforced with fully welded sheet sections to restore the section modulus and to prevent buckling. Welding shall be in accordance with BS 135 and shall be carried out by qualified welders.
- Each mast shall be provided with a bracket to mount the luminaires as specified.
- All ferrous parts of the mast shall be hot dipped galvanized after fabrication in accordance with SABS 763.
- Each mast shall be provided with an internal distribution board with:
 - 3-pole main switch
 - a single phase earth leakage unit
 - 10 x 10A SP circuit breaker
 - 15 A, 3-pin switched socket outlet
 - time switch or photocell
 - contactors for control
- Additional power requirements for the rail row and hydro masts:
 - One 15 amp 3 pin industrial type, switched socket outlet for the hydraulic unit
 - One adequately rated triple pole isolator
 - One 15 amp single pole and neutral moulded case breaker with integral 20 amp earth leakage protection device for control of the switched socket outlet
 - Three adequately rated single pole circuit breakers for the control of the luminaires
 - One 4 way neutral bar
 - One 4 way earth bar

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- All design calculations are to be submitted at time of tender for evaluation by an independent structural Engineer. Failure to submit this documentation will result in a disqualification from the tender.
- The mast manufacturer shall be ISO 9001 – 2000 certified. Failure to submit the proof of certification from your mast supplier may render your tender invalid.

j) Mid-hinge mast

- The mast shall be constructed to form a continuously tapered, totally enclosed, octagonal shaft.
- The mast must consist of a fixed lower part and a moving part hinged to the fixed part at approximately half the height of the mast. The moving part of the mast shall have the floodlight cross-arm mounted on it and must be adequately counterbalanced. The hinge must be made from stainless steel.
- The moving portion shall consist of sections fitted together on site by slip-joints. No welding on site is allowed.
- During raising and lowering and while in the horizontal position, the mast must withstand the wind forces from any direction as well as its own weight and any inertial effects due to sudden stoppage.
- An opening shall be provided in the base of the mast for access to the electrical distribution board. The opening shall only be accessible after the mast lid section has been hinged open. A safety chain must be provided which will ensure safe working conditions while work is conducted on the distribution board.
- The mast must be lowered and raised with a lightweight, manually operated but robust portable winch which can be stored in the base compartment.
- The winch unit must be securely attached to fixed lower part of the mast and the winch cable to the movable part.
- A spring-loaded gravity ratchet must ensure that when the operating handle is released during the raising and lowering operation, the moving part stops in whatever position it is in. The ratchet must be fitted with a lever which must be depressed with a constant pressure during the whole operation of lowering the mast. A round bracket must be welded into the top fixed part of the mast to prevent damage to the trailing cable while lowering or raising the mast.
- The luminaries must be permanently connected to the supply cable, to facilitate testing when the mast is in the lowered position. No additional cable or connections are allowed.
- Masts which require any form of power disconnection while being lowered will not be considered.
- Rail Row Masts
- The mast shaft shall be multi sectional. Each section is constructed from a steel plate, which is cut to size, bent into a 6-sided “half shell” and welded together. Rolled sections will not be accepted.
- Two “half shell” sections are then welded together by means of a continuous long seam weld, to form this section of the mast shaft.
- The floodlight luminaire Ring shall be manufactured in two half-sections, which are bolted together on site. The ring is of a welded steel construction and hot dipped galvanised for

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corrosion protection. The luminaire ring shall be manufactured from 76 x38 rolled channel section and shall be fitted with a 20mm diameter steel bumper ring below the rolled channel. The luminaire ring shall dock into three guides fixed to the top pulley assembly.

- The top pulley assembly consists of a fabricated steel housing, containing the 2 x 280 mm diameter; LM6 cast aluminium pulleys, over which the steel wire ropes pass. Separators – one between the pulleys and one on the outside of each pulley – are provided, to separate the wire ropes and trailing cables and to prevent these from wrapping together, shall the ring be lowered in windy conditions. Each external separator has two close-fitted guides on the outside, to prevent the wire ropes and cables from climbing off the pulleys. Additional deep-groove pulleys are fitted for the electrical trailing cables. All pulleys shall run on stainless steel shafts. The entire assembly is protected against the ingress of water, with a moulded fibreglass canopy, which is bolted to the assembly, with a bolt which incorporates a lightning spike.
- Two steel wire ropes shall be supplied for the purposes of lowering the luminaire ring. All rope connections are done by means of copper “TALURIT” ferrules and crimped with hydraulic crimping tools. The breaking load of the ropes shall be calculated and designed by an Engineer to adequately raise and lower the specified luminaires and luminaire mounting ring.
- The portable winch, used for the raising and lowering of the luminaire ring, shall be a double drum type, as this unit meets all International safety requirements, ensuring that, even in the event of one of the ropes breaking, the luminaire ring is still secured by the second rope. Single drum winch systems WILL NOT BE CONSIDERED. The worm and wheel of the winch are fully immersed in an oil bath and have a gear ratio of 50:1. The winch ropes are terminated in such a manner that distortion and twisting of the ropes is prevented and four turns of the rope remain on the drum, after the ring has been completely lowered. The driving spindle of the winch is automatically locked, when not in use.
- The standard power tool used to drive the winch is a single-phase, single speed electric motor, fitted with a reduction gear box. The power tool, which is slotted into the winch slide, when in use, is supplied complete with a 3 metre cable and remote forward/reverse control switch, for safe operation. The power tool is fitted with a torque limiting device, which is set to slip before any damage can be done to the wire ropes, in the event of over-winding. Hydraulic Power tools shall not be considered
- The following electrical equipment is to be included:
 - The electrical trailing cable, which supplies power to the floodlight luminaires, shall vary in size, depending on the electrical load to be carried and whether or not a photocell is installed on the luminaire ring. The cable shall be 4 mm flexible, multicore, and unarmoured, with “Nitril” insulation. The lower end of the cable terminates in a multi-pin male socket, which in turn, plugs into a multi-pin female socket, mounted in the mast distribution board. The upper end of the cable is fixed to the luminaire ring by means of a cast aluminium clamp and terminates directly in the junction box, mounted on the luminaire ring.
 - A weather-proof junction box shall be fixed to the luminaire ring and provides the termination point for the trailing cable, as well as for the cables which supply power to the floodlight luminaires. The junction box is also fitted with a multi-pin plug, which accepts a test lead, used to test the floodlights, with the ring in the lowered position.
 - If required, the mast can be fitted with a photocell (daylight switch) to switch the floodlights on and off.
 - The mast shall be fitted with a totally enclosed, fibreglass distribution board, fitted in a convenient position in the base of the mast and accessible through the mast access door. The equipment fitted to the distribution board shall vary.
- The mast shall be bolted to a chimney and pad type reinforced concrete foundation with cast in foundation bolts. The design and dimensions of the foundation shall depend on factors

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such as wind velocity size of mast and soil conditions. Designs for foundations are to be signed off by a registered Engineer before construction is started.

k) Hydro Masts

- The mast is made up of two, three or four sections, each with a length of up to approximately 12 m for ease of galvanizing and transportation to site. Each section is constructed from a steel plate, which is cut to size, bent into a six-sided “half shell” and welded together. Two “half shell” sections are then welded together by means of a continuous long seam weld, to form a section of the mast.
- An opening of approximately 250 mm x 750 mm is cut out in the base of the mast. The top and bottom of the opening are curved to avoid stress-concentrations in the corners. The opening perimeter is strongly reinforced to maintain the section modulus of the mast shaft and to prevent buckling. The door provides easy access to the distribution board and ancillary equipment. A weather hood provides protection against ingress of water.
- The size and material thickness of the base plate and gussets depend on the Height and number and type of luminaires installed on the mast. The material is carefully inspected while being flame cut and if required an ultra-sonic inspection shall be carried out. The base plate is welded to the fixed lower section of the mast. Gussets disperse the stress concentrations between the bottom of the mast and the base plate. Two of these gussets (ram lugs) have holes to accept the pivoting pin for attachment of the hydraulic ram.
- One or two 100 mm cable sleeves must be cast in the concrete foundations. A hole in the base plate provides access to the mast for looping in and out of the supply cables.
- The hinge is situated approximately 1.25 m above the base of the mast. The mast, when lowered, shall remain in a horizontal position to facilitate easy maintenance to the luminaires. Fixing points (ram lugs) for the hydraulic rams are provide on the base and the movable upper section. The latter passes through the mast and is welded to the mast on either side. A self-locking mechanism is provided in the base of the mast, securing the upper section in the vertical position even in windy conditions with the wind blowing in any direction. The release handle can only be operated after the hydraulic ram has compressed the neoprene pads, situated between the base and the movable section of the mast.
- Lowering and raising is done with a portable, double acting hydraulic ram, pulling the mast down during lowering and pushing it up during raising. The hydraulic ram can only be operated when the control lever is pushed and held in the operating position; when the control lever is released, the mast stops in whatever position it is in. The ram is securely attached to the upper and lower sections of the mast and cannot be removed during the operation. The ram is fitted with a non-return valve with a limiting oil flow by-pass orifice, ensuring a carefully controlled, pre-determined speed of lowering and preventing any increase in speed in the unlikely event of a complete hydraulic failure or severing of hoses. Heavily loaded 25 m and 30 m masts require a double ram and the 40 m three rams. The hydraulic pump with electric motor is permanently fixed on a trolley which can easily be moved from mast to mast. The ram, when not in use, is firmly attached to the trolley. One unit shall serve any number of masts. With very large installations, it is recommended that a trailer, which can be towed by a vehicle be used, rather than a trolley.
- Cross arms or luminaire brackets are provided on the top of the mast to suit the required type and number of luminaires.
- The design and the dimensions of the concrete foundation depend on mast height, wind velocity, number and type of luminaires as well as the soil conditions. It is important to take into account the position of the luminaires and the direction in which the mast must be lowered when founding the foundation and foundation bolts. Foundation bolts are Hot-Dip galvanized. M39 bolts are normally used; the quantity and centres are determined by the

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size of the mast and the number of luminaires installed. Lighting Structures shall design and construct the foundations on site if required.

- A 5-core flexible neoprene mains supply trailing cable is provided between the distribution board and the weatherproof junction box on the top of the mast. The junction box is fitted with an earth and neutral bars and the required number and size of the cable glands. Each luminaire is connected to the junction box with a 3 core 1.5 mm flexible neoprene cable. The luminaires can be tested in the lowered position without the need of extra cables or connections.
- An earthing stud is welded to the mast structure adjacent to the distribution board. Incoming cables can be connected to this stud.
- A totally enclosed fiberglass power distribution board is mounted in an easily accessible position in the base compartment of the mast. The board is provided with a front cover panel with only the operating toggles of the isolator and circuit breakers protruding.
- The distribution board shall be equipped as described above.

C3.3.4.2.8.6 E100.8.6 PHOTOCELL (DAY/NIGHT SWITCH)

a) General

- The switches are to be used to control streetlights or high mast lighting and shall be fitted with switch contacts able to carry not less than 6A. The current shall not exceed 50mA during no-load conditions.
- The units shall be suited to 240V ± 6%, 50Hz single-phase alternating current.
- The units shall be weatherproof and vibration-resistant as they are to be mounted on top of streetlight luminaires. The units shall be designed to withstand damage by either stone-throwers or hail. If the units do not possess this quality, separate wire screens shall be provided for this purpose. The units shall be supplied with a standard NEMA plug and socket. The socket shall have an arm for mounting on a pole. All parts shall be treated to be corrosion-proof. The units shall be capable of operating in dusty conditions between – 5°C and + 55°C.
- The units shall switch on when the light intensity drops to 15 lx ± 20% and switch off when the light intensity reaches 40 lx ± 20%. When the unit is in the on position, there shall be a time delay of approximately one minute before it switches off due to a sudden increase in the light intensity.
- The design of the switch shall ensure a positive on and off switching at all times.

b) Mounting of photocell

- The photocell shall be mounted on the luminaire closest to the miniature substation the streetlight circuit is to be supplied from by making a hole in the luminaire and fixing the photocell base to the luminaire. The photocell shall be connected to the streetlight control equipment in the streetlight compartment by means of a 1.5 mm², 3-core, copper conductor, PVC, SWA, PVC, cable.
- Where streetlights are to be separately controlled, the photocell shall be mounted onto the luminaire and shall be directly connected to the luminaire.

C3.3.4.2.8.7 E200.8.7 INSTALLATION

a) General

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- If not indicated on drawings, in multiphase street and area lighting installations the circuit arrangement shall be such that adjacent lighting columns are fed from different phases, i.e. staggered such that the neutral current after every third column measures 0A (ignoring here n-th order harmonics). Similarly, where two lighting columns are located opposite each other on a road or street, they shall be fed from different phases. Where road curvature makes this impossible to do and the road has an intersection, the circuit arrangement shall be such that the failure of a phase shall have the least possible effect on illuminance at the intersection. Furthermore, and not diminishing the requirement of above provisions, where multiple luminaires are connected to the same lighting column they shall be fed from separate phases.
- A loop-in cabling system, where single or multiphase cables are looped from source to lighting column to lighting column, shall be employed. Tee-offs will not be accepted (except for the wiring from terminals inside a lighting column to luminaire(s) mounted on the relevant column). Only Pratley or equivalent "end connectors with insulating sleeves" will be accepted.
- For TN-C-S-wired street or area lighting installations, the neutral conductor shall not be connected to the earth conductor downstream of the point of control. Only where required by the electrical supplier shall the circuit breaker inside lighting columns be deemed the point of control.

b) Setting of the works

- The Contractor shall set out the positions of the poles and the cable route as indicated on the drawings. The distance between the poles shall be maintained as specified.
- Where cable route drawings are not provided, cables shall be installed strictly in accordance with the requirements of the local government authority, and in the registered servitude made available for this usage to such authority by the Surveyor-General.

c) Excavations

- The holes for poles shall be excavated to the following depths:

Table 21: Depth of holes for poles

| Description | Mounting Height (m) | Buried (m) | Depth |
|---------------------|---------------------|------------|-------|
| Streetlight Poles | >10.5 | 2 | |
| Streetlight Poles | 7.5 > 10.5 | 1.8 | |
| Area lighting Poles | > 3.5 | 1 | |

- The holes for poles shall have minimum dimensions of 1 metre by 0.5 metres. Once the poles have been erected and aligned the excavations shall be backfilled and compacted in layers of 150 mm to 95% MOD AASHO using material free of stones and vegetation. Where the soil is sandy, loose or marshy, the poles shall be planted in a 12:1 sand/cement mixture.
- Where foundations are required, a minimum of 2 x 50 mm sleeves shall be installed for the installation of cables.

d) Planting of poles

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- The steel and glass filament wound polyester poles shall be fitted with a base plate that shall be securely bolted with hook bolts before the pole is planted.
- The Contractor shall ensure that the poles are not strained or damaged in any way during erection.
- The structures shall be vertical to a tolerance of 0,5% after erection (i.e. the horizontal deviation of the centre of the cross section of the top of the pole from a vertical line originating from the centre of the cross section at the base of the pole shall not be more than 0,05% its height).
- The streetlight poles shall be planted with the luminaire outreach extended in the direction of the roadway and so that the outreach arm is perpendicular to the centre line of the road, except if otherwise specified by the Engineer.
- Where streetlights are installed, the access opening shall be on the opposite side of the direction of the oncoming traffic in the lane closest to the pole (such that any personnel conducting maintenance inside the access opening shall face oncoming traffic).
- Under no circumstances shall poles be shortened to create the impression that they have been planted to the correct depth.

e) Installation

- Each pole shall be fitted with an equipment mounting plate fixed inside the pole. The cables shall be terminated on the gland plate fitted to the mounting plate by means of cable glands.
- A 10A circuit breaker with a 6kA breaking capacity shall be installed for each luminaire in each pole.
- Terminals as specified elsewhere and suitable for the particular cable size shall be used.
- The cable armouring and the earth continuity conductors shall be terminated on the earth stud provided in the pole by means of crimped lugs.
- The connection between the terminals at the access opening and the terminal block of the luminaries shall be made using two PVC insulated 1.5 mm² copper conductors, red for the phase and black for the neutral conductor, and a 1.5 mm² bare copper earth wire for the earth connection.
- After the pole has been planted and the conductors have been drawn in, the streetlight luminaire shall be mounted on the spigot and securely fastened with the bolts and/or nuts to the pole.
- All the bolts, nuts, screws and clips of the fitting shall be properly screwed.

C3.3.4.2.8.8 E100.8.8 DRAWINGS AND DOCUMENTATION

a) General

- Drawings and documentation shall be provided in accordance with the general drawings and documentation standard specifications.

b) Drawings

- The following drawings shall be submitted with the tender:
 - Street and area lighting poles
 - Dimensioned drawing of the poles

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- Detail drawing of the equipment mounting plate
- Fixing detail of access opening cover plate

- Streetlight support arm
 - Dimensioned drawing of the support arm
 - Dimensioned drawing of fixing bracket

C3.3.4.2.8.9 E100.8.9 TESTING AND COMMISSIONING

a) General

- Testing of the streetlight luminaires and poles, area lighting luminaires and poles and high mast lighting shall be tested according to the relevant Testing and Commissioning specification.

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Johannesburg Water SOC Ltd



VOLUME 4

DRAWINGS

JW14471

**RENOVATIONS AT NORTHERN WORKS LABORATORY AND FLOW
LABORATORY**

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
|---------|--|------|----------|------|--------|
| A | <p><u>SECTION No. 1</u></p> <p><u>BILL NO. 1</u></p> <p><u>PRELIMINARIES AND GENERAL</u></p> <p><u>PRELIMINARIES NOTES</u></p> <p>Any reference to the words "Tender" or "Tenderer" herein and/or in any other documentation shall be construed to have the same meaning as the words "Bid" or "Bidder"</p> <p><u>PRELIMINARIES</u></p> <p>The JBCC Preliminaries Code 2103, May 2005 edition for use with the JBCC Principal Building Agreement Edition 4.1 Code 2101, March 2005 is taken to be incorporated herein. The tenderer is deemed to have referred to these documents for the full intent and meaning of each clause. These clauses are referred to by number and heading only. Where standard clauses or options are not applicable to the contract such modifications or corrections as are necessary are given under each relevant clause. Where an item is not relevant to this specific contract such item is marked "N/A" signifying "Not Applicable"</p> <p><u>PRICING OF PRELIMINARIES</u></p> <p>Should Option A, as set out in clause B10.3.1 hereinafter be used for the adjustment of preliminaries then each item priced is to be allocated to one or more of the three categories Fixed, Value Related or Time Related and the respective amounts entered in the spaces provided under each item</p> <p>Items not priced in these Preliminaries shall be deemed to be included elsewhere in these Bills of Quantities</p> <p><u>SECTION A: JBCC PRINCIPAL BUILDING AGREEMENT</u></p> <p><u>DEFINITIONS</u></p> <p>A1.0 DEFINITIONS AND INTERPRETATION Clause 1.0 Clause 1.1 Definition of "Commencement Date" is added:</p> <p>"COMMENCEMENT DATE" means the date that the agreement, made in terms of the Form of Offer and Acceptance, comes into effect</p> <p>Clause 1.1 Definition of "Construction Guarantee" is amended by replacing it with the following:</p> <p>"CONSTRUCTION GUARANTEE" means a guarantee at call obtained by the contractor from an institution approved by the employer in terms of the employer's construction guarantee form as selected in the schedule</p> <p>Clause 1.1 Definition of "Construction Period" is amended by replacing it with the following:</p> <p>"CONSTRUCTION PERIOD" means the period commencing on the commencement date and ending on the date of practical completion</p> <p>Clause 1.1 Definition of "Corrupt Practice" is added:</p> <p>"CORRUPT PRACTICE" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution</p> <p>Clause 1.1 Definition of "Fraudulent Practice" is added:</p> <p>"FRAUDULENT PRACTICE" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of any tenderer and includes collusive practice among tenderers (prior to or after the tender submission) designed to establish tender prices at artificial non-competitive levels and to deprive the tenderer of the benefits of free and open competition</p> | | | | |
| | Total Carried Forward | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
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| Total Brought Forward | | | | | |
| | <p>Clause 1.1 Definition of "Interest" is amended by replacing it with the following:</p> <p>"INTEREST" means the interest rates applicable on this contract, whether specifically indicated in the relevant clauses or not, will be the rate as determined by the Minister of Finance, from time to time, in terms of section 80(1)(b) of the Public Finance Management Act, 1999 (Act No. 1 of 1999)</p> <p>Clause 1.1 Definition of "Principal Agent" is amended by replacing it with the following:</p> <p>"PRINCIPAL AGENT" means the person or entity appointed by the employer and named in the schedule. In the event of a principal agent not being appointed, then all the duties and obligations of a principal agent as detailed in the agreement shall be fulfilled by a representative of the employer as named in the schedule</p> <p>Clause 1.1 Definition of "Security" is amended by replacing it with the following:</p> <p>"SECURITY" means the form of security provided by the employer or contractor, as stated in the schedule, from which the contractor or employer may recover expense or loss</p> <p>Clause 1.6 is amended by replacing the words "prepaid registered post, telefax or e-mail" with "prepaid registered post or telefax"</p> <p>Clause 1.6.4 is amended by replacing it with the following:</p> <p>No clause Fixed:..... Value related:..... Time related:.....</p> | | | | |
| <u>OBJECTIVE AND PREPARATION</u> | | | | | |
| A | <p>A2.0 OFFER, ACCEPTANCE AND PERFORMANCE Clause 2.0 Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| B | <p>A3.0 DOCUMENTS Clause 3.0 Clause 3.2.1 is amended by replacing "14.1" with "14.0" Clause 3.7 is amended by the addition of the following: The contractor shall supply and keep a copy of the JBCC Series 2000 Principal Building Agreement and Preliminaries applicable to this contract on the site, to which the employer, principal agent and agents shall have access at all times Clause 3.10 is amended by replacing the second reference to "principal agent" with the word "employer" Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| C | <p>A4.0 DESIGN RESPONSIBILITY Clause 4.0 Clause 4.3 is amended by replacing it with the following: No clause Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| D | <p>A5.0 EMPLOYER'S AGENTS Clause 5.0 Clause 5.1.2 is amended to include clauses 32.6.3, 34.3, 34.4 and 38.5.8 Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| E | <p>A6.0 SITE REPRESENTATIVE Clause 6.0 Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| F | <p>A7.0 COMPLIANCE WITH REGULATIONS Clause 7.0 Note: A separate clause has been included in Section C : Specific Preliminaries of the bills of quantities / lump sum document for the contractor to have the opportunity to price for all the requirements of the Occupational Health and Safety Act, Construction Regulations and Health and Safety Specification Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| Total Carried Forward | | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
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| Total Brought Forward | | | | | |
| A | A8.0 WORKS RISK Clause 8.0 Fixed:..... Value related:..... Time related:..... | Item | | | |
| B | A9.0 INDEMNITIES Clause 9.0 Fixed:..... Value related:..... Time related:..... | Item | | | |
| C | <p>A10.0 WORKS INSURANCES Clause 10.0 Clause 10.0 is amended by the addition of the following clauses:</p> <p>10.5 Damage to the Works (a) Without in any way limiting the contractor's obligations in terms of the contract, the contractor shall bear the full risk of damage to and/or destruction of the works by whatever cause during construction of the works and hereby indemnifies and holds harmless the employer against any such damage. The contractor shall take such precautions and security measures and other steps for the protection and security of the works as the contractor may deem necessary</p> <p>(b) The contractor shall at all times proceed immediately to remove or dispose of any debris arising from damage to or destruction of the works and to rebuild, restore, replace and/or repair the works</p> <p>(c) The employer shall carry the risk of damage to or destruction of the works and materials paid for by the employer that is the result of the excepted risks as set out in 10.6</p> <p>(d) Where the employer bears the risk in terms of this contract, the contractor shall, if requested to do so, reinstate any damage or destroyed portions of the works and the costs of such reinstatement shall be measured and valued in terms of 32.0 hereof</p> <p>10.6 Injury to Persons or loss of or damage to Properties (a) The contractor shall be liable for and hereby indemnifies the employer against any liability, loss, claim or proceeding whether arising in common law or by statute, consequent upon personal injuries to or the death of any person whomsoever arising out of or in the course of or caused by the execution of the works unless due to any act or negligence of any person for whose actions the employer is legally liable</p> <p>(b) The contractor shall be liable for and hereby indemnifies the employer against any liability, loss, claim or proceeding consequent upon loss of or damage to any moveable or immovable or personal property or property contiguous to the site, whether belonging to or under the control of the employer or any other body or person, arising out of or in the course of or by reason of the execution of the works unless due to any act or negligence of any person for whose actions the employer is legally liable</p> <p>(c) The contractor shall, upon receiving a contract instruction from the principal agent, cause the same to be made good in a perfect and workmanlike manner at his own cost and in default thereof the employer shall be entitled to cause it to be made good and to recover the cost thereof from the contractor or to deduct the same from amounts due to the contractor</p> <p>(d) The contractor shall be responsible for the protection and safety of such portions of the premises placed under his control by the employer for the purpose of executing the works until the issue of the certificate of practical completion</p> <p>(e) Where the execution of the works involves the risk of removal of or interference with support to adjoining properties including land or structures or any structures to be altered or added to, the contractor shall obtain adequate insurance and will remain adequately insured or insured to the specific limit stated in the contract against the death of or injury to persons or damage to such property consequent on such removal or interference with the support until such portion of the works has been completed</p> | | | | |
| Total Carried Forward | | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
|------------------------------|--|------|----------|------|--------|
| Total Brought Forward | | | | | |
| A | <p>(f) The contractor shall at all times proceed immediately at his own cost to remove or dispose of any debris and to rebuild, restore, replace and/or repair such property and to execute the works</p> <p>10.7 High risk insurance In the event of the project being executed in a geological area classified as a "High Risk Area", that is an area which is subject to highly unstable subsurface conditions that might result in catastrophic ground movement evident by sinkhole or doline formation the following will apply:</p> <p>10.7.1 Damage to the works The contractor shall, from the commencement date of the works until the date of the certificate of practical completion bear the full risk of and hereby indemnifies and holds harmless the employer against any damage to and/or destruction of the works consequent upon a catastrophic ground movement as mentioned above. The contractor shall take such precautions and security measures and other steps for the protection of the works as he may deem necessary</p> <p>When so instructed to do so by the principal agent, the contractor shall proceed immediately to remove and/or dispose of any debris arising from damage to or destruction of the works and to rebuild, restore, replace and/or repair the works, at the contractor's own costs</p> <p>10.7.2 Injury to persons or loss of or damage to property The contractor shall be liable for and hereby indemnifies and holds harmless the employer against any liability, loss, claim or proceeding arising at any time during the period of the contract whether arising in common law or by statute, consequent upon personal injuries to or the death of any person whomsoever resulting from, arising out of, or caused by a catastrophic ground movement as mentioned above</p> <p>The contractor shall be liable for and hereby indemnifies the employer against any and all liability, loss, claim or proceeding consequent upon loss of or damage to any moveable or immovable or personal property or property contiguous to the site, whether belonging to or under the control of the employer or any other body or person whomsoever arising out of or caused by a catastrophic ground movement, as mentioned above, which occurred during the period of the contract</p> <p>10.7.3 It is the responsibility of the contractor to ensure that he has adequate insurance to cover his risk and liability as mentioned in 10.7.1 and 10.7.2. Without limiting the contractor's obligations in terms of the contract, the contractor shall, within twenty one (21) calendar days of the commencement date but before commencement of the works, submit to the employer proof of such insurance policy, if requested to do so</p> <p>10.7.4 The employer shall be entitled to recover any and all losses and/or damages of whatever nature suffered or incurred consequent upon the contractor's default of his obligations as set out in 10.7.1; 10.7.2 and 10.7.3. Such losses or damages may be recovered from the contractor or by deducting the same from any amounts still due under this contract or under any other contract presently or hereafter existing between the employer and the contractor and for this purpose all these contracts shall be considered one indivisible whole Fixed:..... Value related:..... Time related:.....</p> | | | | |
| B | A11.0 LIABILITY INSURANCES Clause 11.0 Fixed:..... Value related:..... Time related:..... | | | | |
| C | A12.0 EFFECTING INSURANCES Clause 12.0 Fixed:..... Value related:..... Time related:..... | | | | |
| D | A13.0 No clause | | | | |
| E | A14.0 SECURITY Clause 14.0 Clauses 14.1 - 14.8 are amended by replacing them with the following: | | | | |
| Total Carried Forward | | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
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| Total Brought Forward | | | | | |
| | <p>14.1 In respect of contracts with a contract sum up to R1 million, the security to be provided by the contractor to the employer will be a payment reduction of five per cent (5%) of the value certified in the payment certificate (excluding VAT)</p> <p>14.1.1 The payment reduction of the value certified in a payment certificate shall be mutatis mutandi in terms of 31.8(A)</p> <p>14.1.2 The employer shall be entitled to recover expense and loss from the payment reduction in terms of 33.0 provided that the employer complies with the provisions of 33.4 in which event the employer's entitlement shall take precedence over his obligations to refund the payment reduction security or portions thereof to the contractor</p> <p>14.2 In respect of contracts with a contract sum above R1 million, the contractor shall have the right to select the security to be provided in terms of 14.3, 14.4, 14.5, 14.6, or 14.7 as stated in the schedule. Such security shall be provided to the employer within twenty one (21) calendar days from commencement date. Should the contractor fail to select the security to be provided or should the contractor fail to provide the employer with the selected security within twenty one (21) calendar days from commencement date, the security in terms of 14.7 shall be deemed to have been selected</p> <p>14.3 Where security as a cash deposit of ten per cent (10%) of the contract sum (excluding VAT) has been selected:</p> <p>14.3.1 The contractor shall furnish the employer with a cash deposit equal in value to ten per cent (10%) of the contract sum (excluding VAT) within twenty one (21) calendar days from commencement date</p> <p>14.3.2 Within twenty one (21) calendar days of the date of practical completion of the works the employer shall reduce the cash deposit to an amount equal to three per cent (3%) of the contract value (excluding VAT), and refund the balance to the contractor</p> <p>14.3.3 Within twenty one (21) calendar days of the date of final completion of the works the employer shall reduce the cash deposit to an amount equal to one per cent (1%) of the contract value (excluding VAT) and refund the balance to the contractor</p> <p>14.3.4 On the date of payment of the amount in the final payment certificate, the employer shall refund the remainder of the cash deposit to the contractor</p> <p>14.3.5 The employer shall be entitled to recover expense and loss from the cash deposit in terms of 33.0 provided that the employer complies with the provisions of 33.4 in which event the employer's entitlement shall take precedence over his obligations to refund the cash deposit security or portions thereof to the contractor</p> <p>14.3.6 The parties expressly agree that neither the employer nor the contractor shall be entitled to cede the rights to the deposit to any third party</p> <p>14.4 Where security as a variable construction guarantee of ten per cent (10%) of the contract sum (excluding VAT) has been selected:</p> <p>14.4.1 The contractor shall furnish the employer with an acceptable variable construction guarantee equal in value to ten per cent (10%) of the contract sum (excluding VAT) within twenty one (21) calendar days from commencement date</p> <p>14.4.2 The variable construction guarantee shall reduce and expire in terms of the Variable Construction Guarantee form included in the invitation to tender</p> <p>14.4.3 The employer shall return the variable construction guarantee to the contractor within fourteen (14) calendar days of it expiring</p> | | | | |
| Total Carried Forward | | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
|------------------------------|---|------|----------|------|--------|
| Total Brought Forward | | | | | |
| | <p>14.4.4 Where the employer has a right of recovery against the contractor in terms of 33.0, the employer shall issue a written demand in terms of the variable construction guarantee</p> <p>14.5 Where security as a fixed construction guarantee of five per cent (5%) of the contract sum (excluding VAT) and a five per cent (5%) payment reduction of the value certified in the payment certificate (excluding VAT) has been selected:</p> <p>14.5.1 The contractor shall furnish a fixed construction guarantee to the employer equal in value to five per cent (5%) of the contract sum (excluding VAT)</p> <p>14.5.2 The fixed construction guarantee shall come into force on the date of issue and shall expire on the date of the last certificate of practical completion</p> <p>14.5.3 The employer shall return the fixed construction guarantee to the contractor within fourteen (14) calendar days of it expiring</p> <p>14.5.4 The payment reduction of the value certified in a payment certificate shall be in terms of 31.8 (A) and 34.8</p> <p>14.5.5 Where the employer has a right of recovery against the contractor in terms of 33.0, the employer shall be entitled to issue a written demand in terms of the fixed construction guarantee or may recover from the payment reduction or may do both</p> <p>14.6 Where security as a cash deposit of five per cent (5%) of the contract sum (excluding VAT) and a payment reduction of five per cent (5%) of the value certified in the payment certificate (excluding VAT) has been selected:</p> <p>14.6.1 The contractor shall furnish the employer with a cash deposit equal in value to five per cent (5%) of the contract sum (excluding VAT) within twenty one (21) calendar days from commencement date</p> <p>14.6.2 Within twenty one (21) calendar days of the date of practical completion of the works the employer shall refund the cash deposit in total to the contractor</p> <p>14.6.3 The payment reduction of the value certified in a payment certificate shall be mutatis mutandi in terms of 31.8(A)</p> <p>14.6.4 Where the employer has a right of recovery against the contractor in terms of 33.0, the employer may issue a written notice in terms of 33.4 or may recover from the payment reduction or may do both</p> <p>14.7 Where security as a payment reduction of ten per cent (10%) of the value certified in the payment certificate (excluding VAT) has been selected:</p> <p>14.7.1 The payment reduction of the value certified in a payment certificate shall be mutatis mutandi in terms of 31.8(B)</p> <p>14.7.2 The employer shall be entitled to recover expense and loss from the payment reduction in terms of 33.0 provided that the employer complies with the provisions of 33.4 in which event the employer's entitlement shall take precedence over his obligations to refund the payment reduction or portions thereof to the contractor</p> <p>14.8 Payments made by the guarantor to the employer in terms of the fixed or variable construction guarantee shall not prejudice the rights of the employer or contractor in terms of this agreement</p> | | | | |
| Total Carried Forward | | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
|------------------------------|--|------|----------|------|--------|
| Total Brought Forward | | | | | |
| | <p>14.9 Should the contractor fail to furnish the security in terms of 14.2, the employer, in his sole discretion and without notification to the contractor, is entitled to change the contractor's selected form of security to that of a ten per cent (10%) payment reduction of the value certified in the payment certificate (excluding VAT), whereafter 14.7 shall be applicable Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| | <u>EXECUTION</u> | | | | |
| A | <p>A15.0 PREPARATION FOR AND EXECUTION OF THE WORKS Clause 15.0 Clause 15.1.1 is amended by replacing it with: No clause Clause 15.1.2 is amended by replacing it with: The security selected in terms of 14.0</p> <p>Clause 15.1 is amended by the addition of the following clause: 15.1.4 An acceptable health and safety plan, required in terms of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), within twenty one (21) calendar days of commencement date</p> <p>Clause 15.2.1 is amended by replacing it with the following clause:</p> <p>Give the contractor possession of the site within ten (10) working days of the contractor complying with the terms of 15.1.4 Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| B | <p>A16.0 ACCESS TO THE WORKS Clause 16.0 Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| C | <p>A17.0 CONTRACT INSTRUCTIONS Clause 17.0 Clause 17.1.11 is amended by deleting the words "and the appointment of nominated and selected subcontractors" Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| D | <p>A18.0 SETTING OUT OF THE WORKS Clause 18.0 Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| E | <p>A19.0 ASSIGNMENT Clause 19.0 Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| F | <p>A20.0 NOMINATED SUBCONTRACTORS Clause 20.0 Clause 20.1.3 is amended by replacing it with the following: No clause Note: See item B9.1 hereinafter for adjustment of attendance on nominated subcontractors executing work allowed for under provisional sums Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| G | <p>A21.0 SELECTED SUBCONTRACTORS Clause 21.0 Clause 21 is amended by replacing it with: No clause Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| H | <p>A22.0 EMPLOYER'S DIRECT CONTRACTORS Clause 22.0 Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| I | <p>A23.0 CONTRACTOR'S DOMESTIC SUBCONTRACTORS Clause 23.0 Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| | <u>COMPLETION</u> | | | | |
| J | <p>A24.0 PRACTICAL COMPLETION Clause 24.0 Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| K | <p>A25.0 WORKS COMPLETION Clause 25.0 Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| Total Carried Forward | | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
|------------------------------|--|------|----------|------|--------|
| Total Brought Forward | | | | | |
| A | A26.0 FINAL COMPLETION Clause 26.0 Clause 26.1.2 is amended by inserting "#" next to 26.1.2 Fixed:..... Value related:..... Time related:..... | Item | | | |
| B | A27.0 LATENT DEFECTS LIABILITY PERIOD Clause 27.0 Fixed:..... Value related:..... Time related:..... | Item | | | |
| C | A28.0 SECTIONAL COMPLETION Clause 28.0 Fixed:..... Value related:..... Time related:..... | Item | | | |
| D | A29.0 REVISION OF DATE FOR PRACTICAL COMPLETION Clause 29.0 Clause 29.2.5 is amended by replacing it with: No clause Fixed:..... Value related:..... Time related:..... | Item | | | |
| E | A30.0 PENALTY FOR NON-COMPLETION Clause 30.0 Fixed:..... Value related:..... Time related:..... | Item | | | |
| <u>PAYMENT</u> | | | | | |
| F | <p>A31.0 INTERIM PAYMENT TO THE CONTRACTOR Clause 31.0</p> <p>Clause 31.5.2 is amended by replacing "14.7.1" with "14.0"</p> <p>Clause 31.8 is amended by replacing it with the following two alternative clauses:</p> <p>Alternative A 31.8(A) Where a security is selected in terms of 14.1; 14.5 or 14.6, the value of the works in terms of 31.4.1 and materials and goods in terms of 31.4.2 shall be certified in full. The value certified shall be subject to the following percentage adjustments:</p> <p>31.8(A).1 Ninety five per cent (95%) of such value in interim payment certificates issued up to the date of practical completion</p> <p>31.8(A).2 Ninety seven per cent (97%) of such value in interim payment certificates issued on the date of practical completion and up to but excluding the date of final completion</p> <p>31.8(A).3 Ninety nine per cent (99%) of such value in interim payment certificates issued on the date of final completion and up to but excluding the final payment certificate in terms of 34.6</p> <p>31.8(A).4 One hundred per cent (100%) of such value in the final payment certificate in terms of 34.6 except where the amount certified is in favour of the employer. In such an event the payment reduction shall remain at the adjustment level applicable to the final payment certificate</p> <p>Alternative B</p> <p>31.8(B) Where security as a payment reduction in terms of 14.7 has been selected, the value of the works in terms of 31.4.1 and materials and goods in terms of 31.4.2 shall be certified in full. The value certified shall be subject to the following percentage adjustments:</p> <p>31.8(B).1 Ninety per cent (90%) of such value in interim payment certificates issued up to the date of practical completion</p> <p>31.8(B).2 Ninety seven per cent (97%) of such value in interim payment certificates issued on the date of practical completion and up to but excluding the date of final completion</p> <p>31.8(B).3 Ninety nine per cent (99%) of such value in interim payment certificates issued on the date of final completion and up to but excluding the final payment certificate in terms of 34.6</p> | | | | |
| Total Carried Forward | | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
|------------------------------|---|------|----------|------|--------|
| Total Brought Forward | | | | | |
| | <p>31.8(B).4 One hundred per cent (100%) of such value in the final payment certificate in terms of 34.6 except where the amount certified is in favour of the employer. In such an event the payment reduction shall remain at the adjustment level applicable to the final payment certificate</p> <p>Clause 31.12 is amended by deleting the following:</p> | | | | |
| A | <p>Payment shall be subject to the employer giving the contractor a tax invoice for the amount due Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| B | <p>A32.0 ADJUSTMENT TO THE CONTRACT VALUE Clause 32.0 Clauses 32.5.1, 32.5.4 and 32.5.7 are amended by the addition of the following at the end of the sentence: "due to no fault of the contractor" Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| C | <p>A33.0 RECOVERY OF EXPENSE AND LOSS Clause 33.0 Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| D | <p>A34.0 FINAL ACCOUNT AND FINAL PAYMENT Clause 34.0 Clause 34.1 is amended by removing "#" next to 34.1 Clause 34.2 is amended by inserting "#" next to 34.2 Clause 34.8 is amended by deleting the words "where security as a fixed construction guarantee in terms of 14.4 has been selected or where payment reduction has been applied in terms of 14.7.1" Clause 34.13 is amended by replacing "seven (7) calendar days" with "twenty one (21) calendar days" and deleting the words "subject to the employer giving the contractor a tax invoice for the amount due" Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| E | <p>A35.0 PAYMENT TO OTHER PARTIES Clause 35.0 Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| <u>CANCELLATION</u> | | | | | |
| F | <p>A36.0 CANCELLATION BY EMPLOYER - CONTRACTOR'S DEFAULT Clause 36.0 Clause 36.1 is amended by the addition of the following clauses: 36.1.3 refuses or neglects to comply strictly with any of the conditions of contract 36.1.4 estate being sequestrated, liquidated or surrendered in terms of the insolvency laws in force within the Republic of South Africa 36.1.5 in the judgement of the employer, has engaged in corrupt or fraudulent practices in competing for or in executing the contract Clause 36.3 is amended by removing the reference to "No clause" and replacing the words "principal agent" with "employer"</p> <p>Clause 36.0 is amended by the addition of the following clause:</p> <p>36.7 Notwithstanding any clause to the contrary, on cancellation of this agreement either by the employer or the contractor; or for any reason whatsoever, the contractor shall on written instruction, discontinue with the works on a date stated and withdraw himself from the site. The contractor shall not be entitled to refuse to withdraw from the works on the grounds of any lien or right of retention or on the grounds of any other right whatsoever Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| G | <p>A37.0 CANCELLATION BY EMPLOYER - LOSS AND DAMAGE Clause 37.0 Clause 37.3.5 is amended by replacing "ninety (90)" with "one hundred and twenty (120)"</p> | | | | |
| Total Carried Forward | | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
|---|--|------|----------|------|--------|
| Total Brought Forward | | | | | |
| | Clause 37.0 is amended by the addition of the following clause: 37.5 Notwithstanding any clause to the contrary, on cancellation of this agreement either by the employer or the contractor; or for any reason whatsoever, the contractor shall on written instruction, discontinue with the works on a date stated and withdraw himself from the site. The contractor shall not be entitled to refuse to withdraw from the works on the grounds of any lien or right of retention or on the grounds of any other right whatsoever Fixed:..... Value related:..... Time related:..... | Item | | | |
| A | A38.0 CANCELLATION BY CONTRACTOR - EMPLOYER'S DEFAULT Clause 38.0 Clause 38.5.4 is amended by replacing "ninety (90)" with "one hundred and twenty (120)" Clause 38.0 is amended by the addition of the following clause: | | | | |
| B | 38.7 Notwithstanding any clause to the contrary, on cancellation of this agreement either by the employer or the contractor; or for any reason whatsoever, the contractor shall on written instruction, discontinue with the works on a date stated and withdraw himself from the site. The contractor shall not be entitled to refuse to withdraw from the works on the grounds of any lien or right of retention or on the grounds of any other right whatsoever Fixed:..... Value related:..... Time related:..... | Item | | | |
| C | A39.0 CANCELLATION - CESSATION OF THE WORKS Clause 39.0 Clause 39.3.5 is amended by the addition of the following at the end of the sentence: "within one hundred and twenty (120) working days of completion of such a report" Fixed:..... Value related:..... Time related:..... | Item | | | |
| <u>DISPUTE</u> | | | | | |
| D | A40.0 DISPUTE SETTLEMENT Clause 40.0 Clause 40.2.2 is amended by replacing "one (1) year" with "three (3) years" Clause 40.6 is amended by removing the reference to: No clause Clause 40.7.1 is amended by replacing "(10)" with "(15)" and by the addition of the following: Whether or not mediation resolves the dispute, the parties shall bear their own costs concerning the mediation and equally share the costs of the mediator and related costs Fixed:..... Value related:..... Time related:..... | Item | | | |
| <u>SUBSTITUTE PROVISIONS</u> | | | | | |
| E | A41.0 STATE CLAUSES Clause 41.0 Fixed:..... Value related:..... Time related:..... | Item | | | |
| <u>CONTRACT VARIABLES</u> | | | | | |
| F | A42.0 THE SCHEDULE (DPW-04EC) Clause 42.0 Tenderers are referred to the Contract Data DPW-04(EC) for variables pertaining to this contract Fixed:..... Value related:..... Time related:..... | Item | | | |
| <u>SECTION B: JBCC PRELIMINARIES</u> | | | | | |
| <u>B1.0 DEFINITIONS AND INTERPRETATION</u> | | | | | |
| G | B1.1 Definitions and interpretation See also clause A1.0 of Section A for additional and/or amended definitions which shall apply equally to this Section Fixed:..... Value related:..... Time related:..... | Item | | | |
| <u>B2.0 DOCUMENTS</u> | | | | | |
| H | B2.1 Checking of documents Fixed:..... Value related:..... Time related:..... | Item | | | |
| I | B2.2 Provisional bills of quantities Fixed:..... Value related:..... Time related:..... | Item | | | |
| Total Carried Forward | | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
|--|---|------|----------|------|--------|
| Total Brought Forward | | | | | |
| A | B2.3 Availability of construction documentation Fixed:..... Value related:..... Time related:..... | Item | | | |
| B | B2.4 Interests of agents Fixed:..... Value related:..... Time related:..... | Item | | | |
| C | B2.5 Priced documents Fixed:..... Value related:..... Time related:..... | Item | | | |
| D | B2.6 Tender submission Clause 2.6 is amended by replacing "JBCC Form of Tender" with "Form of Offer and Acceptance DPW-07(EC)" Fixed:..... Value related:..... Time related:..... | Item | | | |
| <u>B3.0THE SITE</u> | | | | | |
| E | B3.1 Defined works area Fixed:..... Value related:..... Time related:..... | Item | | | |
| F | B3.2 Geotechnical investigation Fixed:..... Value related:..... Time related:..... | Item | | | |
| G | B3.3 Inspection of the site Fixed:..... Value related:..... Time related:..... | Item | | | |
| H | B3.4 Existing premises occupied Fixed:..... Value related:..... Time related:..... | Item | | | |
| I | B3.5 Previous work - dimensional accuracy Fixed:..... Value related:..... Time related:..... | Item | | | |
| J | B3.6 Previous work - defects Fixed:..... Value related:..... Time related:..... | Item | | | |
| K | B3.7 Services - known Fixed:..... Value related:..... Time related:..... | Item | | | |
| L | B3.8 Services - unknown Fixed:..... Value related:..... Time related:..... | Item | | | |
| M | B3.9 Protection of trees Fixed:..... Value related:..... Time related:..... | Item | | | |
| N | B3.10 Articles of value Fixed:..... Value related:..... Time related:..... | Item | | | |
| O | B3.11 Inspection of adjoining properties Fixed:..... Value related:..... Time related:..... | Item | | | |
| <u>B4.0MANAGEMENT OF CONTRACT</u> | | | | | |
| P | B4.1 Management of the works Fixed:..... Value related:..... Time related:..... | Item | | | |
| Q | B4.2 Programme for the works Fixed:..... Value related:..... Time related:..... | Item | | | |
| R | B4.3 Progress meetings Fixed:..... Value related:..... Time related:..... | Item | | | |
| Total Carried Forward | | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
|--|---|------|----------|------|--------|
| Total Brought Forward | | | | | |
| A | B4.4 Technical meetings Fixed:..... Value related:..... Time related:..... | Item | | | |
| B | B4.5 Labour and plant records Fixed:..... Value related:..... Time related:..... | Item | | | |
| <u>B5.0SAMPLES, SHOP DRAWINGS AND MANUFACTURERS" INSTRUCTIONS</u> | | | | | |
| C | B5.1 Samples of materials Fixed:..... Value related:..... Time related:..... | Item | | | |
| D | B5.2 Workmanship samples Fixed:..... Value related:..... Time related:..... | Item | | | |
| E | B5.3 Shop drawings Fixed:..... Value related:..... Time related:..... | Item | | | |
| F | B5.4 Compliance with manufacturers' instructions Fixed:..... Value related:..... Time related:..... | Item | | | |
| <u>B6.0TEMPORARY WORKS AND PLANT</u> | | | | | |
| G | B6.1 Deposits and fees Fixed:..... Value related:..... Time related:..... | Item | | | |
| H | B6.2 Enclosure of the works Fixed:..... Value related:..... Time related:..... | Item | | | |
| I | B6.3 Advertising Fixed:..... Value related:..... Time related:..... | Item | | | |
| J | B6.4 Plant, equipment, sheds and offices Fixed:..... Value related:..... Time related:..... | Item | | | |
| K | B6.5 Main notice board Fixed:..... Value related:..... Time related:..... | Item | | | |
| L | B6.6 Subcontractors' notice board Fixed:..... Value related:..... Time related:..... | Item | | | |
| <u>B7.0TEMPORARY SERVICES</u> | | | | | |
| M | B7.1 Location Fixed:..... Value related:..... Time related:..... | Item | | | |
| N | B7.2 Water Fixed:..... Value related:..... Time related:..... | Item | | | |
| O | B7.3 Electricity Fixed:..... Value related:..... Time related:..... | Item | | | |
| P | B7.4 Telecommunication facilities Fixed:..... Value related:..... Time related:..... | Item | | | |
| Q | B7.5 Ablution facilities Fixed:..... Value related:..... Time related:..... | Item | | | |
| <u>B8.0PRIME COST AMOUNTS</u> | | | | | |
| R | B8.1 Responsibility for prime cost amounts Fixed:..... Value related:..... Time related:..... | Item | | | |
| Total Carried Forward | | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
|---|---|------|----------|------|--------|
| Total Brought Forward | | | | | |
| <u>B9.0 ATTENDANCE ON N/S SUBCONTRACTORS</u> | | | | | |
| A | B9.1 General attendance Fixed:..... Value related:..... Time related:..... | Item | | | |
| B | B9.2 Special attendance Fixed:..... Value related:..... Time related:..... | Item | | | |
| C | B9.3 Commissioning - fuel, water and electricity Fixed:..... Value related:..... Time related:..... | Item | | | |
| <u>B10.0 FINANCIAL ASPECTS</u> | | | | | |
| D | B10.1 Statutory taxes, duties and levies Fixed:..... Value related:..... Time related:..... | Item | | | |
| E | B10.2 Payment for preliminaries Fixed:..... Value related:..... Time related:..... | Item | | | |
| F | B10.3 Adjustment of preliminaries Clauses B10.3.1 and B10.3.2 are amended by replacing "within fifteen (15) working days of taking possession of the site" with "when submitting his priced bills of quantities / lump sum document" Fixed:..... Value related:..... Time related:..... | Item | | | |
| G | B10.4 Payment certificate cash flow Fixed:..... Value related:..... Time related:..... | Item | | | |
| <u>B11.0 GENERAL</u> | | | | | |
| H | B11.1 Protection of the works Fixed:..... Value related:..... Time related:..... | Item | | | |
| I | B11.2 Protection / isolation of existing / sectionally occupied works Fixed:..... Value related:..... Time related:..... | Item | | | |
| J | B11.3 Security of the works Fixed:..... Value related:..... Time related:..... | Item | | | |
| K | B11.4 Notice before covering work Fixed:..... Value related:..... Time related:..... | Item | | | |
| L | B11.5 Disturbance Fixed:..... Value related:..... Time related:..... | Item | | | |
| M | B11.6 Environmental disturbance Fixed:..... Value related:..... Time related:..... | Item | | | |
| N | B11.7 Works cleaning and clearing Fixed:..... Value related:..... Time related:..... | Item | | | |
| O | B11.8 Vermin Fixed:..... Value related:..... Time related:..... | Item | | | |
| P | B11.9 Overhand work Fixed:..... Value related:..... Time related:..... | Item | | | |
| Q | B11.10 Instruction manuals and guarantees Fixed:..... Value related:..... Time related:..... | Item | | | |
| R | B11.11 As built information Fixed:..... Value related:..... Time related:..... | Item | | | |
| Total Carried Forward | | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
|--|--|------|----------|------|--------|
| Total Brought Forward | | | | | |
| A | B11.12 Tenant installations Fixed:..... Value related:..... Time related:..... | Item | | | |
| <u>B12.0SCHEDULE OF VARIABLES</u> | | | | | |
| B | <p>B12.1 Schedule of variables Fixed:..... Value related:..... Time related:.....</p> <p>This schedule contains all variables referred to in this document and is divided into pre-tender and post-tender categories. The pre-tender category must be completed in full and included in the tender documents. Both the pre-tender and post-tender categories form part of these Preliminaries</p> <p>Spaces requiring information must be filled in, shown as "not applicable" or deleted and not left blank. Where choices are offered, the non-applicable items are to be deleted. Where insufficient space is provided the information should be annexed hereto and cross-referenced to the applicable clause of the schedule. Key cross reference clauses are italicised in [] brackets</p> <p>12.1 PRE-TENDER INFORMATION 12.1.1 Provisional bills of quantities [2.2] The quantities are provisionalYES</p> <p>12.1.2 Availability of construction documentation [2.3] Construction documentation is completeNO</p> <p>12.1.3Interests of agents [2.4]Details:</p> <p>12.1.4Defined works area [3.1]Details:</p> <p>12.1.5Geotechnical investigation [3.2]Details:</p> <p>12.1.6Existing premises occupied [3.4]Specific requirements:</p> <p>12.1.7Previous work - dimensional accuracy [3.5]Details:</p> <p>12.1.8Previous work - defects [3.6]Details:</p> <p>12.1.9 Services - known [3.7] Details: All known services to be pointed out to the contractor on site handover</p> <p>12.1.10Protection of trees [3.9]Specific requirements:</p> <p>12.1.11Inspection of adjoining properties [3.11]Specific requirements:</p> <p>12.1.12 Enclosure of the works [6.2] Specific requirements: The demolition and new construction works including temporary accommodation to be enclosed as required for the protection and safety of the learners and the community</p> <p>12.1.13 Offices [6.4.3] Specific requirements: The contractor shall provide, maintain and remove on completion of the works an office for the exclusive use of the principal agent, minimum size 4 x 3 x 3m high internally, suitably insulated and ventilated, provided with electric lighting and fitted with boarded floor, desk, chair, drawing stool, drawing board and lock-up drawers for drawings. The office shall be kept clean and fit for use at all times</p> | Item | | | |
| Total Carried Forward | | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
|------------------------------|---|------|----------|------|--------|
| Total Brought Forward | | | | | |
| | <p>12.1.14 Main notice board [6.5] Specific requirements: The contractor shall provide, erect where directed, maintain and remove on completion of the works a notice board size 3 x 3m as type Drawing GEN 063, constructed of suitable boarding with flat smooth surface and with edging bead 19mm thick round outer edges and projecting 12mm from face of boarding and rounded on front edge. The board shall be securely fixed to hoarding, where hoarding is provided, or fixed to and including a suitable supporting structure of timber or tubular posts and braces. The board is to be painted ivory white and the bead and 12mm wide dividing lines dark green. All wording shall be inscribed in dark green as per the coat of arms for SA. All wording shall be inscribed in dark green painted sans serif lettering</p> <p>12.1.15 Subcontractors' notice board [6.6] A notice board is required NO Specific requirements:</p> <p>12.1.16 Water [7.2] Option A (by contractor) YES Option B (by employer - free of charge)NO Option C (by employer - metered)NO</p> <p>12.1.17 Electricity [7.3] Option A (by contractor) YES Option B (by employer - free of charge)NO Option C (by employer - metered)NO</p> <p>12.1.18 Telecommunications [7.4] Telephone YES FacsimileYES E-mailYES</p> <p>12.1.19 Ablution facilities [7.5] Option A (by contractor) YES Option B (by employer)NO</p> <p>12.1.20 Protection of existing/sectionally occupied works [11.2] Protection is requiredYES/NO</p> <p>12.1.21 Special attendance [9.2] Subcontractor (1) details: Subcontractor (2) details: Subcontractor (3) details: Subcontractor (4) details:</p> <p>12.1.22Protection of the works [11.1]Specific requirements:</p> <p>12.1.23 Disturbance [11.5] Specific requirements: The contractor shall keep the site, structures, etc well watered during operations to prevent dust and shall provide and erect and remove on completion of the works all necessary temporary dust screens all to the satisfaction of the principal agent.</p> <p>12.1.24 Environmental disturbance [11.6] Specific requirements: All work to be carried out in accordance with the requirements as set out in the Environmental Specification</p> <p>12.2POST TENDER INFORMATION</p> <p>12.2.1 Payment of preliminaries [10.2] Option A (prorated) YES/NO Option B (calculated)YES/NO</p> <p>12.2.2 Adjustment of preliminaries [10.3] Option A (three categories) YES/NO Option B (detailed breakdown)YES/NO</p> <p>12.2.3Additional agreed preliminaries items Details:</p> | | | | |
| Total Carried Forward | | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
|---|---|------|----------|------|--------|
| Total Brought Forward | | | | | |
| <u>SECTION C: SPECIFIC PRELIMINARIES</u> | | | | | |
| A | <p>C1. OCCUPATIONAL HEALTH AND SAFETY ACT The contractor shall comply with all the requirements set out in the Construction Regulations, 2003 issued under the Occupational Health and Safety Act, 1993 (Act No 85 of 1993). It is required of the contractor to thoroughly study the Health and Safety Specification that must be read together with and is deemed to be incorporated under this Section of the bills of quantities. The contractor must take note that compliance with the Occupational Health and Safety Act, Construction Regulations and Health and Safety Specification is compulsory. In the event of partial or total non-compliance, the principal agent, notwithstanding the provisions of clause A31.0 of Section A or any other clause to the contrary, reserves the right to delay issuing any progress payment certificate until the contractor provides satisfactory proof of compliance. The contractor shall not be entitled to any compensation of whatsoever nature, including interest, due to such delay of payment. Provision for pricing of the Occupational Health and Safety Act, Construction Regulations and Health and Safety Specification is made under this clause and it is explicitly pointed out that all requirements of the aforementioned are deemed to be priced hereunder and no additional claims in this regard shall be entertained Fixed:..... Value related:..... Time related:.....</p> | Item | | | |
| B | <p>C2. PROPRIETARY BRANDED PRODUCTS The contractor shall take delivery of, handle, store, use apply and/or fix all proprietary branded products in strict accordance with the manufacturers instruction after consultation with the manufacturer's authorised representative Fixed:..... Value Related:..... Time Related:.....</p> | Item | | | |
| C | <p>C3. OVERTIME Should overtime be required to be worked for any reason whatsoever, the costs of such overtime are to be borne by the contractor unless the principal agent has specifically authorised in writing, prior to the execution thereof, that costs for such overtime are to be borne by the employer. Fixed:..... Value Related:..... Time Related:.....</p> | Item | | | |
| D | <p>C4. AS BUILT DRAWINGS Not applicable Fixed:..... Value Related:..... Time Related:.....</p> | Item | | | |
| E | <p>C5. SITE INSTRUCTIONS Site instructions issued on site are to be recorded in triplicate in a site instruction book which is to be maintained on site by the contractor Fixed:..... Value Related:..... Time Related:.....</p> | Item | | | |
| F | <p>C6. LABOUR RECORD At the end of each week the contractor shall provide the principal agent with a written record, in schedule form, reflecting the number and description of tradesmen and labourers employed by him and all subcontractors on the works each day. Fixed:..... Value Related:..... Time Related:.....</p> | Item | | | |
| G | <p>C7. PLANT RECORD At the end of each week the contractor shall provide the principal agent with a written record, in schedule form, reflecting the number, type and capacity of all plant, excluding hand tools, currently used on the works. Fixed:..... Value Related:..... Time Related:.....</p> | Item | | | |
| H | <p>C8. NON CESSION OF MONIES The contractor shall not cede nor assign his rights or claims to any monies due or to become due under this contract Fixed:..... Value Related:..... Time Related:.....</p> | Item | | | |
| <u>MATERIALS AND WORKMANSHIP</u> | | | | | |
| I | Not applicable | Item | | | |
| Total Carried Forward | | | | | |

| ITEM NO | DESCRIPTION | UNIT | QUANTITY | RATE | AMOUNT |
|---------------------------------|--|------|----------|------|--------|
| Total Brought Forward | | | | | |
| | <p><u>Guarantees</u></p> <p>The contractor shall obtain written guarantees where called for, addressed to the employer, from the firms supplying the materials or doing the work and deliver such guarantees to the principal agent. The guarantees shall state that workmanship, materials and installation are guaranteed for a specified period reckoned from the date of practical completion of the works and that any defects in the workmanship, materials and installation that may arise during that period shall be made good at the expense of the firm doing the work upon written notice from the principal agent or the employer to do so</p> <p><u>FINANCIAL ASPECTS</u></p> <p><u>Overtime</u></p> <p>A The additional costs of overtime work shall be for the employer's account only when prior written agreement thereto is given by the principal agent</p> <p><u>MONITORING</u></p> <p>B Additional financial provision, for the requirements of the Occupational Health and Safety Act including safety plans, files etc</p> | Item | | | |
| Total Carried to Summary | | | | | |

| ITEM NO | PAYMENT REFERS | SHORT DESCRIPTION | UNIT | QUANTITY | RATE (R) | AMOUNT (R) |
|----------|------------------|---|----------|----------|-----------|------------|
| 2 | SANS 1200 | SECTION 2: DAYWORKS, PROVISIONAL SUMS AND PRIME COST ITEMS | | | | |
| 2.1 | | DAYWORKS | | | | |
| | | <u>Labour</u> | | | | |
| 2.1.1 | | Allow for total remuneration paid to workers | Prov Sum | 1 | 50 000.00 | 50 000.00 |
| 2.1.2 | | Overheads, charges and profit on 2.1.1 | % | 50 000 | | |
| 2.1.3 | | Team Leader / charge hand | hr | 35 | | |
| 2.1.4 | | Artisan | hr | 45 | | |
| 2.1.5 | | Skilled | hr | 45 | | |
| 2.1.6 | | Semi-skilled | hr | 75 | | |
| 2.1.7 | | Unskilled | hr | 100 | | |
| 2.1.8 | | Engineer | hr. | 5 | | |
| 2.1.9 | | Technician | hr. | 5 | | |
| 2.1.10 | | Foreman | hr. | 10 | | |
| 2.1.11 | | Driver (LDV, machine, trucks, etc.) | hr. | 10 | | |
| 2.1.12 | | Certified Blaster | hr. | 10 | | |
| 2.1.13 | | Steel fixer | hr. | 10 | | |
| 2.1.14 | | Concretor | hr. | 10 | | |
| 2.1.15 | | Charge hand | hr. | 10 | | |
| 2.1.16 | | Security guard | hr. | 10 | | |
| | | <u>Plant and equipment</u> | | | | |
| 2.1.17 | | (a) Tractor loader backhoe (TLB) (i) Tractor Loader Backhoe (Bigger than 45kW but smaller than 70kW) | hr. | 10 | | |
| 2.1.18 | | (b) Crawler Excavators (i) Smaller than 93kW (small) | hr. | 10 | | |
| 2.1.19 | | (ii) Bigger than 93kW but smaller than 200kW (Medium) | hr. | 10 | | |
| 2.1.20 | | (c) Tipper Trucks (i) Tipper trucks (3m³) Small | hr. | 10 | | |
| 2.1.21 | | (ii) Tipper trucks (5m³) Medium | hr. | 10 | | |
| 2.1.22 | | (iii) Tipper trucks (10m³) Large | hr. | 10 | | |
| 2.1.23 | | (d) Flat Bed Trucks (i) Flat bed 5t capacity | hr. | 8 | | |
| 2.1.24 | | (ii) Flat bed 7t capacity | hr. | 8 | | |
| 2.1.25 | | (e) LDV (i) 1t Pick-up | hr. | 10 | | |
| 2.1.26 | | (f) Mobile Crane 5t at 3m radius | hr. | 10 | | |
| 2.1.27 | | (g) Walk behind vibrating rollers (i) Model - Bomag 60 or similar (small) | hr. | 10 | | |
| 2.1.28 | | (ii) Model - Bomag 76 or similar (medium) | hr. | 10 | | |
| 2.1.29 | | (iii) Model - Bomag 90 or similar | hr. | 10 | | |
| | | TOTAL CARRIED FORWARD | | | | R |

| ITEM NO | PAYMENT REFERS | SHORT DESCRIPTION | UNIT | QUANTITY | RATE (R) | AMOUNT (R) | |
|---------|----------------|--|----------|----------|------------|------------|--|
| | | TOTAL BROUGHT FORWARD | | | | R | |
| 2.1.30 | | (h) Plate compactors (i) Vipac or similar | hr. | 10 | | | |
| 2.1.31 | | (i) Rammers (i) Model - Wacker or similar | hr. | 10 | | | |
| 2.1.32 | | (j) Concrete mixers | | | | | |
| 2.1.33 | | (i) Volume 100 litre wet (small, towable) | hr. | 8 | | | |
| 2.1.34 | | (ii) Volume 175 litre wet (medium) | hr. | 8 | | | |
| 2.1.35 | | (iii) Volume 250 litre wet (large) | hr. | 8 | | | |
| | | (k) Diesel compressors including hoses and tools | hr | 10 | | | |
| 2.1.36 | | (i) Capacity smaller than 200 cfm (small) | hr. | 10 | | | |
| 2.1.37 | | (ii) Capacity bigger than 200 cfm smaller than 400 cfm (medium) | hr. | 10 | | | |
| 2.1.38 | | (iii) Capacity bigger than 400 cfm (large) | hr. | 10 | | | |
| 2.1.39 | | (l) Waterpump | | | | | |
| 2.1.40 | | (i) Capacity smaller than 400 litre/min | hr | 10 | | | |
| 2.1.41 | | (ii) Capacity bigger than 400 but smaller than 600 litre/min (medium) | hr | 10 | | | |
| 2.1.42 | | (iii) Capacity bigger than 600 but smaller than 1 100 litre/sec (large) | hr | 10 | | | |
| | | <u>Materials</u> | | | | | |
| 2.1.43 | | Net cost of goods or materials | Prov Sum | 1 | 10 000.00 | 10 000.00 | |
| 2.1.44 | | Overheads, charges and profit on 2.1.43 above | % | 10 000 | | | |
| | | <u>Contractors own Plant</u> | | | | | |
| 2.1.45 | | Allow for all-inclusive cost of using Contractor's own plant on site. | Prov Sum | 1 | 100 000.00 | 100 000.00 | |
| 2.1.46 | | Overheads, charges and profit on 2.1.45 above | % | 100 000 | | | |
| | | <u>Plant hired by the Contractor</u> | | | | | |
| 2.1.47 | | Net cost of hired plant | Prov Sum | 1 | 100 000.00 | 100 000.00 | |
| 2.1.48 | | Overheads, charges and profit on 2.1.11 above | % | 100 000 | | | |
| | | <u>Survey Beacons/Pegs</u> | | | | | |
| 2.1.49 | | Search for, record, reference and protect survey stations, bench marks, erf boundary pegs and other reference pegs and expose on completion of works | Sum | 1 | | | |
| 2.2 | | SUMS STATED PROVISIONALLY BY THE ENGINEER | | | | | |
| 2.2.1 | | Equipment for the Employers Agent Representative and their assistant for the duration of the contract | Prov Sum | 1 | 50 000.00 | 50 000.00 | |
| 2.2.2 | | Overheads, charges and profit on 2.2.1 above | % | 50 000 | | | |
| | | TOTAL CARRIED FORWARD | | | | R | |

| ITEM NO | PAYMENT REFERS | SHORT DESCRIPTION | UNIT | QUANTITY | RATE (R) | AMOUNT (R) |
|---|----------------|---|----------|----------|------------|------------|
| TOTAL BROUGHT FORWARD | | | | | | R |
| | | <u>Survey</u> | | | | |
| 2.2.3 | | Ad-hoc topographical survey as requested by the Engineer during the contract | Prov Sum | 1 | 15 000.00 | 15 000.00 |
| 2.2.4 | | Overheads, charges and profit on 2.2.3 | % | 15 000 | | |
| | | <u>Community Liason Officer and</u> | | | | |
| 2.2.5 | | Employment of the CLO for duration of contract who shall be appointed by the Contractor and shall report to the Engineer and the Client (R8500 pm plus R500 pm cellphone allowance) | Prov Sum | 1 | 100 000.00 | 100 000.00 |
| 2.2.6 | | Overheads, charges and profit on 2.2.5 | % | 100 000 | | |
| 2.2.7 | | Sundries | Prov Sum | 1 | 165 000.00 | 165 000.00 |
| | | <u>Training</u> | | | | |
| 2.2.8 | | Provisional Sum for Training / Upskilling Employees | Prov Sum | 1 | 256 500.00 | 256 500.00 |
| 2.2.9 | | Overheads, charges and profit on 2.2.8 | % | 256 500 | | |
| | | <u>Re-vegetation</u> | | | | |
| 2.2.10 | | Re-vegetation of the site | Prov Sum | 1 | 25 080.00 | 25 080.00 |
| 2.2.11 | | Overheads, charges and profit on 2.2.10 | % | 25 080 | | |
| | | <u>Pipework</u> | | | | |
| 2.2.12 | | Connection to existing / proposed pipework | Prov Sum | 1 | 50 000.00 | 50 000.00 |
| 2.2.13 | | Overheads, charges and profit on 2.2.12 | % | 50 000 | | |
| | | <u>Control Testing</u> | | | | |
| 2.2.14 | | Acceptance Control Testing | Prov Sum | 1 | 100 000.00 | 100 000.00 |
| 2.2.15 | | Overheads, charges and profit on 2.2.14 | % | 100 000 | | |
| 2.3 | | MISCELLANEOUS | | | | |
| 2.3.1 | | Allow for the attendance of EME's or QSE's and other Contractors within the parameters of the site | Sum | 1 | | |
| TOTAL FOR SECTION 2 CARRIED FORWARD TO SUMMARY | | | | | | R |

| ITEM NO | PAYMENT REFERS | SHORT DESCRIPTION | UNIT | QUANTITY | RATE (R) | AMOUNT (R) |
|---|------------------|---|----------------|----------|------------|------------|
| | SANS 1200 | SECTION 3: SITE CLEARANCE | | | | |
| 3.1 | | JW FFENNEL ROAD DEPOT | | | | |
| 3.1.1 | | CLEAR SITE | | | | |
| | | Clear and grub site and remove any obstruction that may occur and spoil to designated site. Only areas indicated in writing by Engineer must be cleared: | | | | |
| 3.1.1.1 | | Exceeding but not exceeding 0.0 m to 1.3 m Soft material | m ³ | 110 | | |
| 3.1.1.2 | | 0.0 m to 5 m Intermediate material | m ³ | 100 | | |
| 3.1.1.3 | | Tar cut & remove | m ² | 100 | | |
| 3.1.1.4 | | Finishing off of the site on completion of the works to the satisfaction of the Engineer, including levelling off, disposal of surplus material, etc. | Prov Sum | Prov Sum | 200 000.00 | 200 000.00 |
| 3.2 | | NORTHERN WORKS DEPOT | | | | |
| 3.2.1 | | CLEAR SITE | | | | |
| 3.2.2 | | Clear and remove old furniture from the laboratory | Sum | Sum | | |
| 3.2.3 | | Transport old furniture from item 3.2.2 above to specified sites and dump | Sum | Sum | | |
| TOTAL FOR SECTION 3 CARRIED FORWARD TO SUMMARY | | | | | R | |



| ITEM NO | PAYMENT REFERS | SHORT DESCRIPTION | UNIT | QUANTITY | RATE (R) | AMOUNT (R) |
|---|------------------|---|----------------|----------|------------|------------|
| 4 | SANS 1200 | SECTION 4: REMOVAL AND REPLACEMENT OF STEEL COLUMN BASES AND CORRODED STEEL BEAMS | | | | |
| | | JW FFENNELL ROAD DEPOT | | | | |
| 4.1 | | STEEL WORK | | | | |
| 4.1.1 | | Removal and replacement of steel grated platform to gain access to corroded steel columns and beams | m ² | 30 | | |
| 4.1.2 | | Removal and replacement of 160mm H channel steel beam to IPE 100 | m | 30 | | |
| 4.1.3 | | Removal and replacement of 80mm channel steel beam | m | 45 | | |
| 4.1.4 | | Remove and replace support steel columns (length= 5m,size 100mm SHS to IPE 180,plate=160mmx160mm to 250x250x10mm) | m | 70 | | |
| 4.1.5 | | Remove L channel steel support column,Length= 1.51m,size= 75mm) | m | 20 | | |
| 4.1.6 | | Steel work connections | Sum | Sum | | |
| 4.1.7 | | Remove and replace Catladders (1,5m in length) | No. | 2 | | |
| 4.1.8 | | New Base plates (250 X 250 X 10mm) | No. | 14 | | |
| 4.1.9 | | New End plates (250 X 250 X 10mm) | No. | 14 | | |
| 4.1.10 | | New Angle irons (100 X 100 X 6mm) | No. | 120 | | |
| 4.1.11 | | New Steel Reinforcements (Size - Y12 High Yield Strength) as per bar bending schedule | t | 3 | | |
| 4.1.12 | | Break and build new 25Mpa concrete base | m ³ | 5 | | |
| 4.2 | | Sundries | Prov Sum | Prov Sum | 100 000.00 | 100 000.00 |
| TOTAL FOR SECTION 4 CARRIED FORWARD TO SUMMARY | | | | | | |

| ITEM NO | PAYMENT REFERS | SHORT DESCRIPTION | UNIT | QUANTITY | RATE (R) | AMOUNT (R) |
|---|------------------|---|----------------|----------|-----------|------------|
| 5 | SANS 1200 | SECTION 5: LEAKING SUMP | | | | |
| | | JW FFENNEL ROAD DEPOT | | | | |
| 5.1 | | SUBSOIL DRAINAGE | | | | |
| 5.1.1 | | 110mm diameter perforated Pipe Wrapped with Geotextile Biddum | m | 15 | | |
| 5.1.2 | | 110mm Steel Pipe | m | 3 | | |
| 5.1.3 | | 19mm Stone Aggregate | m ³ | 8 | | |
| 5.1.4 | | Dump Rock | m ³ | 23 | | |
| 5.1.5 | | Fine Soil | m ³ | 3 | | |
| 5.1.6 | | 110mm Non Return Valve | No | 1 | | |
| 5.2 | | STRUCTURE | | | | |
| 5.2.1 | | Form Work | m ² | 200 | | |
| 5.2.2 | | Reinforced Concrete Channel Lining to 25Mpa Strength on existing brick channel Refer to drawing - CW - 02 - REV 0 | m ³ | 25 | | |
| 5.2.3 | | Mesh REF 395 | m ² | 240 | | |
| 5.2.4 | | Repair of existing damaged concrete surface within the water sump using approved product as per JW specifications | m ² | 385 | | |
| 5.2.5 | | Sealing of the repaired concrete surface within the water sump using approved product as per JW specifications | m ² | 490 | | |
| 5.2.6 | | Swell Product for Sealing the repaired concrete Channel as per JW specifications | Prov Sum | Prov Sum | 10 000.00 | 10 000.00 |
| 5.2.7 | | Supply and Install Cat ladder | No | 1 | | |
| TOTAL FOR SECTION 5 CARRIED FORWARD TO SUMMARY | | | | | R | |

| ITEM NO | PAYMENT REFERS | SHORT DESCRIPTION | UNIT | QUANTITY | RATE (R) | AMOUNT (R) |
|---|------------------|---|------|----------|----------|------------|
| 6 | SANS 1200 | SECTION 6: STORMWATER JW FFENNELL ROAD DEPOT | | | | |
| 6.1 | | 600mm Diameter Concrete pipeline (Refer to drawing - CW-02 - REV 0) | m | 60 | | |
| 6.2 | | Reinforced Concrete Drainage Channel (600 X 600mm) Square Channel (Refer to drawing - CW -02 - REV 0) | m | 50 | | |
| 6.3 | | Reinforced Concrete Manhole (Size 3500 X 1400 X 1200mm Depth) Refer to drawing - CW - 02 - REV 0) | No | 1 | | |
| TOTAL FOR SECTION 6 CARRIED FORWARD TO SUMMARY | | | | | | R |

| ITEM NO | PAYMENT REFERS | SHORT DESCRIPTION | UNIT | QUANTITY | RATE (R) | AMOUNT (R) |
|------------------------------|----------------|--|----------------|----------|------------|------------|
| 7 | | SECTION 7: LABORATORY RENOVATION | | | | |
| | | NORTHERN WORKS DEPOT | | | | |
| | | <i>All work should be done in accordance to ISO/IEC 17025 STANDARDS</i> | | | | |
| 7.1 | | Northern Works Laboratory | | | | |
| | | Supply and deliver 12 mm thick white worktop phenolic resin | m ² | 24 | | |
| 7.1.1 | | Supply and install 16mm Class 1 white melamine chipboard | m ² | 80 | | |
| 7.1.2 | | Supply and fit 96mm handle | No | 20 | | |
| 7.1.3 | | Supply and install Carcass 1mm edged round | m | 50 | | |
| 7.1.4 | | Supply and fit Drawers and doors 2mm impact edged | No | 11 | | |
| 7.1.5 | | Supply and install Standard runners for drawers up to 600mm wide | No | 58 | | |
| 7.1.6 | | Supply and install Tandem runners for drawers over 600mm wide of supply stable movement under load-maximum 40 | No | 2 | | |
| 7.1.7 | | SANS 10400-T compliant fire-rated door Including all accessories, lintels, etc. to Architect specification | Prov Sum | Prov Sum | 15 000.00 | 15 000.00 |
| 7.1.8 | | Office furniture | Prov Sum | Prov Sum | 150 000.00 | 150 000.00 |
| 7.1.9 | | Office partition | Prov Sum | Prov Sum | 8 000.00 | 8 000.00 |
| 7.1.10 | | Laboratory and kitchen chairs | Prov Sum | Prov Sum | 40 000.00 | 40 000.00 |
| 7.1.11 | | Burglar Bars On existing windows | Prov Sum | Prov Sum | 30 000.00 | 30 000.00 |
| 7.1.12 | | IT Equipment | Prov Sum | Prov Sum | 350 000.00 | 350 000.00 |
| 7.1.13 | | Alarm System | Prov Sum | Prov Sum | 60 000.00 | 60 000.00 |
| 7.2 | | Main Laboratory | | | | |
| 7.2.1 | | Supply and install 3000x1500x900 Island bench with 600mm double service modules | No | 4 | | |
| 7.2.2 | | Supply and deliver 3000x1500x12mm worktop | m ² | 14 | | |
| 7.2.3 | | Supply and install End sink with double/cold-faucet and drainage | No | 2 | | |
| 7.2.4 | | Supply and install Polypropylene drainage with bottle trap | m | 12 | | |
| 7.2.5 | | Two service modules; supply and fit two trays, electrical sockets one each side and two data points | No | 12 | | |
| 7.2.6 | | One cabinet underneath model L1065CCDD with two 150mm deep drawers and two doors with a shelf | No | 1 | | |
| 7.2.7 | | Supply and install One cabinet underneath model L1065D4 with four 150mm deep drawers and two doors with a shelf | No | 1 | | |
| 7.2.8 | | Supply and install two cabinets underneath model L565C with one door with a shelf | No | 2 | | |
| 7.2.9 | | Supply and deliver 11500x750x12mm Worktop | m ² | 9 | | |
| 7.2.10 | | Supply and install Three cabinets underneath model L1065CCDD with two 150mm deep drawers and two doors and a shelf | No | 3 | | |
| 7.2.11 | | Supply and install sliding door | No | 3 | | |
| 7.2.12 | | Supply and install glass door | No | 1 | | |
| TOTAL CARRIED FORWARD | | | | | | R |

| TOTAL CARRIED FORWARD | | | | R | |
|------------------------------|---|----------------|----------|------------|------------|
| 7.2.13 | Supply and install Two cabinets underneath model L565C with a door | No | 2 | | |
| 7.2.14 | Supply and install Electrical power skirting with 11 sockets | m | 11 | | |
| 7.2.14 | Suppy and install 2900x750x900mm High wall bench | No | 1 | | |
| 7.2.15 | Supply and deliver 2900x750x12mm worktop | m ² | 2 | | |
| 7.2.16 | Supply and install Two cabinets underneath model L565C with one door and a shelf | No | 2 | | |
| 7.2.17 | Cold room with chromadek panels measuring 2m(width) X 3m(length) X 2.5m height with 5.5KW compressor and stainless steel shelving to fit inside the cold room | No | 1 | | |
| 7.2.18 | LED lights with motion sensors | No | 45 | | |
| 7.2.19 | Electrical Sundries | Prov Sum | Prov Sum | 200 000.00 | 200 000.00 |
| 7.3 | HVAC | | | | |
| 7.3.1 | HVAC System | Prov Sum | Prov Sum | 250 000.00 | 250 000.00 |
| 7.3.2 | Biometric System | Prov Sum | Prov Sum | 70 000.00 | 70 000.00 |
| 7.4 | Fume Cupboards (Main laboratory) | | | | |
| 7.4.1 | Manufacture, supply and install three L5EFC low flow 1800 x 1400x900mm deep extraction fume cabinets with under cabinets stated: | No | 1 | | |
| 7.4.2 | Supply and install Fully intergrated alarm system | No | 1 | | |
| 7.4.3 | Supply and install Acid and solvent storage cabinets 1500x900x900 | No | 1 | | |
| 7.5 | Research Laboratory | | | | |
| 7.5.1 | Supply and install C1:5000x750x900 high wall bench; | No | 1 | | |
| 7.5.2 | Supply and deliver 5000x750x12mm worktop | m ² | 3 | | |
| 7.5.3 | Supply and install Two cabinets underneath model L1065CCDD | No | 2 | | |
| 7.5.3 | Supply and install with two 150mm deep drawers and doors with ashelf | No | 4 | | |
| 7.5.4 | Supply and install Electrical power skirting with 4 sockets | m | 11 | | |
| 7.5.5 | Supply and install C2:7300x750x900 island bench with; | No | 1 | | |
| 7.5.6 | Supply and deliver 7300x750x12mm worktop | m ² | 8 | | |
| 7.5.7 | Supply and install On four drawer cabinets L1065D4 with 150mm deep drawers | No | 4 | | |
| 7.5.8 | Floor tiles for the research lab to match existing | m ² | 42 | | |
| TOTAL CARRIED FORWARD | | | | R | |

| TOTAL CARRIED FORWARD | | | | | R |
|---|---|----------------|----------|------------|------------|
| 7.5.9 | Supply and install One cabinet underneath model L1065CCDD | No | 1 | | |
| 7.5.10 | Supply and fit with two 150mm deep drawers; | No | 2 | | |
| 7.5.11 | Supply and install Electrical power skirting with 6 sockets | m | 12 | | |
| 7.5.12 | Supply and install C3: 2000x750x900 wall bench | No | 1 | | |
| 7.5.13 | Supply and deliver 2000x750x12mm Worktops | m ² | 2 | | |
| 7.5.14 | Supply and install Sink with double hot/cold faucet and drainage | No | 1 | | |
| 7.5.15 | Supply and fit Polypropylene drainage with bottle trap | m | 6 | | |
| 7.5.16 | Supply and install Electrical power skirting with 3 sockets | m | 6 | | |
| 7.5.17 | Supply and install C4: 2000x750x900 wall bench | m | 1 | | |
| 7.5.18 | Supply and deliver 200x750x12mm worktops | m | 2 | | |
| 7.5.19 | Supply and install Two cabinets underneath model L1065CCDD with two 150 deep drawers and two doors with a shelf | No | 1 | | |
| 7.5.20 | Supply and install Sink with double hot/cold faucet and drainage | No | 1 | | |
| 7.5.21 | Supply and fit Polypropylene drainage with bottle trap | m | 6 | | |
| 7.5.22 | Supply and install Electrical power skirting with 3 sockets | m | 5 | | |
| 7.6 | Bottle Wash Laboratory | | | | |
| 7.6.1 | Supply and install D1:5000x750x12mm worktop | m ² | 4 | | |
| 7.6.2 | Supply and install Three cabinets underneath model L1065CCDD | No | 3 | | |
| 7.6.3 | Supply and fit with two 150mm deep drawers and two doors with a shelf | No | 2 | | |
| 7.6.4 | Supply and install Electrical power skirting with 4 sockets | m | 5 | | |
| 7.6.5 | Supply and install D2: 1500x750x900 high wall bench | No | 1 | | |
| 7.6.6 | Supply and deliver 1500x750x12mm worktops | m ² | 2 | | |
| 7.6.7 | Supply and fit One cabinet underneath model L1065CC with two doors and a shelf | No | 1 | | |
| 7.6.8 | Supply and install One double sink with hot/cold faucets | No | 1 | | |
| 7.7 | Kitchen | | | | |
| 7.7.1 | Supply and install Sink with double hot/cold faucet drainage | No | 1 | | |
| 7.7.2 | Kitchen accessories | Prov Sum | Prov Sum | 120 000.00 | 120 000.00 |
| 7.8 | Cold room | | | | |
| 7.8.1 | Break existing floor and build new 150mm thick R.C concrete plinth(25Mpa) | m ³ | 2 | | |
| TOTAL FOR SECTION 7 CARRIED FORWARD TO SUMMARY | | | | | R |

| SUMMARY OF SCHEDULE OF QUANTITIES | | |
|---|---|--------------|
| SECTION | DESCRIPTION | TOTAL |
| SECTION 1: | PRELIMINARY AND GENERAL | R |
| SECTION 2: | DAYWORKS, PROVISIONAL SUMS & PRIME COST ITEMS | R |
| SECTION 3: | SITE CLEARANCE | R |
| SECTION 4: | MEZZANINE STRUCTURE (FFENNELL ROAD DEPOT) | R |
| SECTION 5: | LEAKING SUMP (FFENNELL ROAD DEPOT) | R |
| SECTION 6: | STORMWATER (FFENNELL ROAD DEPOT) | R |
| SECTION 7: | LABORATORY RENOVATION (NORTHERN WORKS DEPOT) | R |
| TOTAL FOR SCHEDULE OF QUANTITIES | | R |
| ADD 10% CONTINGENCIES | | R |
| SUB-TOTAL | | R |
| ADD 15 % VAT | | R |
| TOTAL FOR TENDER (FORWARD TO THE FORM OF TENDER) | | R |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION

| | |
|-------------------|---|
| PROJECT NUMBER: | JW 14471 |
| PROJECT LOCATION: | Northern Works & Ffennell Flow Lab |
| PROJECT DESCR: | Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory |

ANNEXURE 1: BASELINE RISK ASSESSMENT



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION

| | |
|-------------------|---|
| PROJECT NUMBER: | JW 14471 |
| PROJECT LOCATION: | Northern Works & Ffennell Flow Lab |
| PROJECT DESCR: | Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory |

ANNEXURE 2: MEDICAL SCREENING POLICY



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION

| | |
|-------------------|---|
| PROJECT NUMBER: | JW 14471 |
| PROJECT LOCATION: | Northern Works & Ffennell Flow Lab |
| PROJECT DESCR: | Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory |

ANNEXURE 3: SIGN OFF FORM



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION

| | |
|-------------------|---|
| PROJECT NUMBER: | JW 14471 |
| PROJECT LOCATION: | Northern Works & Ffennell Flow Lab |
| PROJECT DESCR: | Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory |

ANNEXURE 4: ENVIRONMENTAL MANAGEMENT PLAN



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION

| | |
|-------------------|---|
| PROJECT NUMBER: | JW 14471 |
| PROJECT LOCATION: | Northern Works & Ffennell Flow Lab |
| PROJECT DESCR: | Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory |

ANNEXURE 5:

JW 6.4 (RETURNABLE ANNEXURE A)



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
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2001

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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.

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.

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ENVIRONMENTAL MANAGEMENT PLAN

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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DISCLAIMER

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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.
- All appointees shall be suitably trained and certified competent for the responsibilities they are assigned for.

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- 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 | <p>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.</p> <p>The recommended and/or market related minimum salary/wages for Environmental Representative should be R10 000.00.</p> |
| Consultant Environmental Control Office | Authorised project (as and when required) | JW EMP and Project Specific approved EMP /Directives/Environmental Authorisation/GA/WUL | <p>Reputable Environmental Consulting Company</p> <p>National Diploma or BA/BSc Environmental Science or Management + 3 years' experience as an independent ECO/Consultant</p> |
| 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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| | | | <p>Landscaping Specialist should at least have BA/BSc Honours Degree or 4-year Degree in Natural Sciences/Ecological.</p> <ul style="list-style-type: none"> - 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Screening report Tender document | Keep the records of the project screening report and scope of work as per Directives |
| Authorisation | 2 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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/Inductions | 4 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Visual inspection Site establishment checklist/Method statement | Method statements approved by CAPEX and the Environmental Officer <ul style="list-style-type: none"> 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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| | | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 EMPr 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 | <ul style="list-style-type: none"> Before workers start working onsite Before new activities are undertaken | <ul style="list-style-type: none"> Check training attendance register Observe whether activities are executed in line with EMPr requirements | <ul style="list-style-type: none"> Proportion of workers that completed. Environmental training Compliance of workers with EMP |
| Plant Search and Rescue/Vegetation clearing | 3 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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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| | <p>areas nearby. This could involve growing these plants on in an off-site nursery for a period of time.</p> <ul style="list-style-type: none"> 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. <p>Aftercare and monitoring</p> | | | | <p>development footprint</p> <ul style="list-style-type: none"> Size of area disturbed outside of construction site boundary. Areas of development footprint must be clearly demarcated |
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| | <ul style="list-style-type: none"> 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. <p>Applicable Legislation</p> <ul style="list-style-type: none"> 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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| <p>Excavation</p> | <p>4</p> | <ul style="list-style-type: none"> • 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. | <p>All Contractors</p> | <p>Throughout construction</p> | <p>Visual inspection</p> | <ul style="list-style-type: none"> • Daily site inspection. • Damage to the environment (sensitive environment) |
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| | | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Incident of incorrect storage and harvesting. • Manifestation of alien invasive plants. • Incident of erosions. |

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| | <p>vehicles are allowed access onto the stockpiles after they have been placed.</p> <ul style="list-style-type: none"> • 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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| | | <p>procedures must be applied to all embankments that are disturbed and destabilized as per the Authorisation</p> <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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/Johannesburg Water | <ul style="list-style-type: none"> Before Construction commences During earthworks | Visual inspection | <ul style="list-style-type: none"> Discovery of possible archaeological material Rescue and reporting of identified material when discovered |
| Protection of paleontological resources | 7 | <ul style="list-style-type: none"> Identify a stand-by palaeontologist to inspect fossils if they are discovered during construction activities. | Johannesburg Water | Prior commencement | Visual inspection | <ul style="list-style-type: none"> Discovery of possible |

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| | | <ul style="list-style-type: none"> 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 | | <p>archaeological material.</p> <ul style="list-style-type: none"> Rescue and reporting of identified material when discovered. |
| Concrete / cement Work/Batching plant | 8 | <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> Number of incidents of batching outside works footprint. Contamination of water and soil; and Visible litter / waste on site. |

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| | <ul style="list-style-type: none"> • 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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| | | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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, riprap, stone pitching, | All Contractors | Throughout construction/post construction | Visual inspection | <ul style="list-style-type: none"> • Incidence of storm water contamination. • Visible leaks/ water wastage. • And Visible surface erosion. |

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| | <p>gabions, use of geotextiles) e.g., biojute must be used at the direction of the JW Engineer.</p> <ul style="list-style-type: none"> • 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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| | | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Visible air pollution. |

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| | | <p>activities e.g., dust clouds may reduce visibility affecting sports activities.</p> <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Community complaints. Complaints register. Daily environmental inspection |

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| | <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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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| | | <p>contravention of the specifications of this document endanger his/her life or cause him/her to damage the environment.</p> <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Visual inspection. Way-leaves | <ul style="list-style-type: none"> Daily inspection Environmental incident. |

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| | | <ul style="list-style-type: none"> 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 | <p>Flora</p> <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Visual inspection Way-leave from City Parks. Biodiversity permit from Gauteng Department of Rural and Development | <ul style="list-style-type: none"> Environmental incident register Daily inspection Number of environmental incidents. Fauna and flora removal and relocation register |

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| | | <p>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.</p> <ul style="list-style-type: none"> No tree outside the footprint of the Works area must be damaged. <p>Fauna</p> <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Visual inspection Wayleaves from different entities. | <ul style="list-style-type: none"> Incident register. Permit/ Way-leave register Complaints register. |

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| | | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Incident register. Complaints register. |

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| | | <ul style="list-style-type: none"> 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. | | | | <ul style="list-style-type: none"> Permit register. |
| Workshops, storage areas and materials handling | 16 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Visual inspection Method statement for handling hazardous substances. MSDS | <ul style="list-style-type: none"> Hazardous substances register. MSDS file Spill register Incident register. |

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| | <p>maintained by the fuel suppliers. Leakage of fuel shall be avoided.</p> <ul style="list-style-type: none"> • 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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| | <ul style="list-style-type: none"> • 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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| | | <ul style="list-style-type: none"> • 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 | <p>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.</p> <ul style="list-style-type: none"> • 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 <p>Solid waste</p> <p>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.</p> <ul style="list-style-type: none"> • All general waste drums or skips will be appropriately labelled GENERAL WASTE | All Contractors | Throughout Construction | <ul style="list-style-type: none"> • 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/ | <ul style="list-style-type: none"> • Littering • Soil contamination • Water pollution. |

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| | <ul style="list-style-type: none"> • 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. <p>Litter</p> <ul style="list-style-type: none"> • 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. <p>Hazardous waste</p> <ul style="list-style-type: none"> • 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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| | <ul style="list-style-type: none"> • 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)). <p>HAZARDOUS WASTE.</p> <ul style="list-style-type: none"> • 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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| | <ul style="list-style-type: none"> • 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. <p>Medical Waste</p> <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Visual inspection • Records of waste manifest/disposal certificates/ weighbridge slip | <ul style="list-style-type: none"> • Incidence of staff not using Facilities • Incidence of pollution |
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| | <ul style="list-style-type: none"> • 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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| | | <p>required; these must be provided by service provider.</p> <ul style="list-style-type: none"> 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 | <p>Access Roads</p> <ul style="list-style-type: none"> 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. <p>Traffic Control</p> <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Method statement for access road and traffic control. Way-leave | <ul style="list-style-type: none"> Daily Inspection checklist. Environmental incident. Incident register. |

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| Electrical | 20 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Permit OHS approval letter Wayleave | <ul style="list-style-type: none"> Approval letter Electrical certificate |
| Development Footprint | 21 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Agreement letter. Wayleave | <ul style="list-style-type: none"> Incident register. Complaints register. |
| Fire Prevention | 22 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Visual inspection Emergency Response Plan. | <ul style="list-style-type: none"> Fire extinguisher inspection checklist. Incident register Mock drill report. |

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| | | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Results of random noise measurements Number of registered complaints |
| Complaints | 24 | <p>Maintain complaints register for all complaints. The register must list:</p> <ul style="list-style-type: none"> Complainant name and contact details. Date complaint was lodged. Person who recorded the complaint. Nature of the complaint. | All Contractors | Throughout construction | Complaints register | <ul style="list-style-type: none"> Availability of register on site Designated person to maintain register |

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| | | <ul style="list-style-type: none"> • 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. | | | | <ul style="list-style-type: none"> • Complaints logged • Complaints followed up and Closed out. |
| Housekeeping | 25 | <ul style="list-style-type: none"> • 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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| | | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Incidence of non-compliance Incidence of leaks and spills Cost of cleaning up spills |
| Safety and Security | 27 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Inspect attendance register for training sessions Inspect fire extinguishers | <ul style="list-style-type: none"> Number of fire incidents Certified extinguishers in appropriate locations |

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| | | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Maintain register of pollution events and response Following resumption of activities, frequently inspect repaired | <ul style="list-style-type: none"> Number of incidents Time activities stopped Number of recurring Incidents Availability and 65completeness of register |

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| | | <ul style="list-style-type: none"> • 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 | <p>Objective</p> <ul style="list-style-type: none"> • 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. <p>Mitigation Measures</p> <ul style="list-style-type: none"> • Identify and demarcate construction areas for general construction work and restrict construction activity to these areas. Prevent unnecessary | All Contractors | Throughout Construction | <ul style="list-style-type: none"> • Visual inspection. • Storm water management Plan. • Way-leave from JRA | <ul style="list-style-type: none"> • Daily inspection checklist. • Incident register. |

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| | | <p>destructive activity within construction areas (prevent over-excavations)</p> <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> • 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 | <p>Objective To ensure re-vegetation and rehabilitation of disturbed areas is undertaken</p> <p>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.</p> <p>Mitigation measures In order to meet this goal, the following objective, actions, and monitoring requirements are relevant:</p> <ul style="list-style-type: none"> • Disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local | All Contractors | Throughout Construction | <ul style="list-style-type: none"> • Rehabilitation Plan • JW EMP • Visual inspection • Ecologist Specialist report • Environmental Authorisation/ GA • Practical and completion certificate. | <ul style="list-style-type: none"> • Daily inspection checklist. • Rehabilitation report • Waste management collection report (Waste Disposal Certificate). |

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| | <p>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.</p> <ul style="list-style-type: none"> • 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. <p>Management and Mitigation Requirement</p> <ul style="list-style-type: none"> • Conduct a detailed search of at the area. As a minimum, this should take place during the | | | <ul style="list-style-type: none"> • Community Happy Letters. | |
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| | | <p>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;</p> <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Meeting invite • Visual inspection | <ul style="list-style-type: none"> • Meeting invite • Attendance register • Snag list • Signed practical and final completion inspection letter. |
| Final close out report | 31 | <ul style="list-style-type: none"> • 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. | <ul style="list-style-type: none"> • Final audit report. • Signing of Audit reports. | <ul style="list-style-type: none"> • 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 | | | | | | |
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| Aspects | ID | Mitigation Measure/Procedure | Responsible | Implementation Timeframe | Monitoring Methods | Performance indicators |
| Waste Management | 1 | <p>Sanitation Facilities</p> <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> 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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| | | <p>disposal facility for each disposal and retained on site.</p> <ul style="list-style-type: none"> 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. <p>Contaminated water</p> <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Limit the footprint of the maintenance and operational activities to the minimum to minimise environmental damage. | Johannesburg Water | <ul style="list-style-type: none"> During operation and maintenance activities/. | Visual inspection | <ul style="list-style-type: none"> Incidents of vegetation damage. |

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ENVIRONMENTAL MANAGEMENT PLAN

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| | | <ul style="list-style-type: none"> 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. | | <ul style="list-style-type: none"> When is necessary? | | <ul style="list-style-type: none"> Number of incidents of disturbance of vegetation outside site boundary. |
| Alien invasive/weeds control | 3 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Visual inspection. | <ul style="list-style-type: none"> Daily inspections register. Incident register. |

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ENVIRONMENTAL MANAGEMENT PLAN

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| | <p>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.</p> <ul style="list-style-type: none"> • 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. | | | <ul style="list-style-type: none"> • Monitoring against Vegetation Management Plan. • PCO certificate. | |
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| | | <ul style="list-style-type: none"> • Empty containers of herbicides disposed of accordingly to the registered hazardous landfill site. • Proof of disposal provided to JW Environmental Section. | | | | |
| Sludge Management | 4 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Visual inspection according to Sludge SOP. • Monitoring against Sludge Guideline. • Monitoring against WUL. | <ul style="list-style-type: none"> • Sludge test report • Complaints register. • Sludge spill register. • Environmental Officers Internal WUL Audit Report. |
| Workshop and storage Area | 5 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Visual inspection • SOP for handling hazardous substances. • MSDS register | <ul style="list-style-type: none"> • Workshop and storage register. • MSDS register. • Incident register. |

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| | <ul style="list-style-type: none"> • 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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| | | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Maintain complaints register for all complaints. The register must list: | Johannesburg Water | During operations and maintenance activities | <ul style="list-style-type: none"> • Complaints register. | <ul style="list-style-type: none"> • Availability of register on site |

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| | | <ul style="list-style-type: none"> 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. | | | <ul style="list-style-type: none"> GDARD complaints reference number. | <ul style="list-style-type: none"> Designated person to maintain register Complaints logged Complaints followed up and closed out. |
| Collection of water sample | 7 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Visual inspection. Online Lab reports | <ul style="list-style-type: none"> Daily water sample report. Incident register. |
| Environmental Incident reporting and Emergency Response and Preparedness | 8 | <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> Visual inspection. Flash report/ Incident investigation report. Section 30A Annexure A. JW Environmental Emergency Preparedness | <ul style="list-style-type: none"> Incident register Bioremediation report. Section 30A Directive. Corrective Action Plan |

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| | | <ul style="list-style-type: none"> • 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. |
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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.

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| Water Usage | 9.1 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Visual inspection • Meter readings | <ul style="list-style-type: none"> • Records of Monthly water Usage. |
| Reduce water demand | 9.2 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Monthly Monitoring • Monthly water | <ul style="list-style-type: none"> • Records of percentage reduction on non-revenue water. • Records of Percentage |

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ENVIRONMENTAL MANAGEMENT PLAN

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| | | <ul style="list-style-type: none"> 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. | | | management report | reduction of Rand Water system input volume. |
| Incentivise water saving interventions across domestic and economic sector users. | 9.3 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> Monthly water management report | <ul style="list-style-type: none"> Records of reduction in annual water consumption per capita Water from alternative sources as % of total water supply |
| Rehabilitation/ Reinstatement | 10 | <ul style="list-style-type: none"> 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 | <ul style="list-style-type: none"> EO compliance monitoring Visual inspection. Compliance inspection against rehabilitation plan. | <ul style="list-style-type: none"> Inspection report. Audit report by External Auditor. Photos before and after. |

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ENVIRONMENTAL MANAGEMENT PLAN

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| | | | | | • JW EMP. |
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ENVIRONMENTAL MANAGEMENT PLAN

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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ENVIRONMENTAL MANAGEMENT PLAN

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 compiled 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. | | |
| The collection and disposal of construction waste (concrete, wood, steel) | Biweekly | CR |
| Collection of hazardous waste. | Monthly Biweekly | CR/JW |
| | | 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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DISCLAIMER

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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 EMP. 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 | |
| <ul style="list-style-type: none"> • I undertake to adhere to the requirements as set out in: <ul style="list-style-type: none"> - 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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|  <p style="font-size: small;">a world class African city</p> | <h3>CONTRACTORS ENVIRONMENTAL FILE EVALUATION FORM</h3> <p>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.</p> | | | | |
| ENVIRONMENTAL SYSTEM EVALUATION OUTCOME | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 75%;">AVERAGE SCORE OBTAINED</td> <td style="text-align: center; background-color: #92d050;">0.00%</td> </tr> <tr> <td colspan="2" style="text-align: center; background-color: #92d050;">APPROVED/REJECTED</td> </tr> </table> | | AVERAGE SCORE OBTAINED | 0.00% | APPROVED/REJECTED | |
| 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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| | | |
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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

| | |
|--|--|
| <p>ENVIRONMENTAL MANAGEMENT (EM) SITE INSTRUCTION</p> <p>Document No: JW- EMS-HO—R014</p> | |
| <ol style="list-style-type: none"> 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. (<i>where applicable</i>): | 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. | | | |

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a world class African city



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

- 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.



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ENVIRONMENTAL MANAGEMENT PLAN

COMMENTS BY CONTRACTOR (*WHERE APPLICABLE*):

Follow up comments by
JW Environmental Representative

DISCLAIMER

- 1.Should there be any other Environmental related activities issued as non-compliance during construction, the contractor is liable to comply with those requirements
- 2.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
3. This EMP does not exempt the Contractor from complying with other relevant legislations related to the construction activities.

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 |

DISCLAIMER

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- 2.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
3. This EMP does not exempt the Contractor from complying with other relevant legislations related to the construction activities.

| | | |
|---|---|---|
|  Johannesburg Water | OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION | |
| | TENDER NUMBER: | JW 14471 |
| | PROJECT LOCATION: | Northern Works & Ffennell Flow Lab |
| | PROJECT DESCRIPTION: | Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory |

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 2)
- 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 T2.12 as applicable*



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

| | |
|-------------------|---|
| PROJECT NUMBER: | JW 14471 |
| PROJECT LOCATION: | Northern Works & Ffennell Flow Lab |
| PROJECT DESCR: | Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory |

BASELINE RISK ASSESSMENT



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

| | |
|-------------------|---|
| PROJECT NUMBER: | JW 14471 |
| PROJECT LOCATION: | Northern Works & Ffennell Flow Lab |
| PROJECT DESCR: | Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory |

ACTIVITY: SITE ESTABLISHMENT

| Task | Hazard | Risk | Consequence | Rating | Controls |
|------------------------------|---|---|--|----------|---|
| Site establishment | <ul style="list-style-type: none"> ✓ 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 | <ul style="list-style-type: none"> ✓ Cuts ✓ Slips and trips ✓ Damage to services ✓ Using the environment as ablution facilities | <ul style="list-style-type: none"> ✓ Injuries ✓ Back strains and injuries ✓ Crime, theft, fights ✓ Contracting of communicable diseases ✓ Soil, water pollution | M | <ul style="list-style-type: none"> ✓ 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 | <ul style="list-style-type: none"> ✓ Using lifting equipment ✓ Faulty equipment ✓ Faulty slings / chains | <ul style="list-style-type: none"> ✓ Wind ✓ Incompetent personnel ✓ Heavy load ✓ Failing of lifting equipment | <ul style="list-style-type: none"> ✓ Serious injuries ✓ Property damage | H | <ul style="list-style-type: none"> ✓ 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 |
| Entry and exit | <ul style="list-style-type: none"> ✓ No access control | <ul style="list-style-type: none"> ✓ Unauthorised entry into the construction site | <ul style="list-style-type: none"> ✓ Injuries ✓ Theft | M | <ul style="list-style-type: none"> ✓ Appoint a full time, registered security guard on site |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

| | |
|-------------------|---|
| PROJECT NUMBER: | JW 14471 |
| PROJECT LOCATION: | Northern Works & Ffennell Flow Lab |
| PROJECT DESCR: | Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory |

ACTIVITY: SITE ESTABLISHMENT

| Task | Hazard | Risk | Consequence | Rating | Controls |
|--------------------------------|---|---|---|----------|--|
| Electrical installation | <ul style="list-style-type: none"> ✓ Electricity ✓ Incompetent personnel ✓ Wrong tools ✓ Damaged cables | <ul style="list-style-type: none"> ✓ Contact with live electricity ✓ Incompetent person connecting electricity ✓ Electric shocks | <ul style="list-style-type: none"> ✓ Electrocution ✓ Serious injuries | H | <ul style="list-style-type: none"> ✓ 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 |
| Stacking and storage | <ul style="list-style-type: none"> ✓ Unsafe stacks of materials or pallets | <ul style="list-style-type: none"> ✓ Falling of pallets and material on employees | <ul style="list-style-type: none"> ✓ Injuries ✓ Property damage | M | <ul style="list-style-type: none"> ✓ 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

| | |
|-------------------|---|
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| PROJECT DESCR: | Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory |

ACTIVITY: TRANSPORTATION OF MATERIALS TO SITE

| Task | Hazard | Risk | Consequence | Rating | Controls |
|---|---|---|---|----------|--|
| Transportation of material to site | <ul style="list-style-type: none"> ✓ 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 | <ul style="list-style-type: none"> ✓ Overturning vehicles ✓ Vehicle collisions ✓ Bumping pedestrians / employees | <ul style="list-style-type: none"> ✓ Injuries ✓ Property damages ✓ Third party liability | M | <ul style="list-style-type: none"> ✓ 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 | <ul style="list-style-type: none"> ✓ Faulty lifting machinery & equipment ✓ Suspended load ✓ Poor housekeeping | <ul style="list-style-type: none"> ✓ Malfunctioning ✓ Falling on employees ✓ Obstructed walkways by materials | <ul style="list-style-type: none"> ✓ Injuries | M | <ul style="list-style-type: none"> ✓ 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

| | |
|-------------------|---|
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| PROJECT DESCR: | Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory |

ACTIVITY: GENERATOR USAGE

| Task | Hazard | Risk | Consequence | Rating | Controls |
|------------------------------|------------------|-----------------------|------------------------------|--------|---|
| Fueling the generator | ✓ Spillages | ✓ Slips, trips, falls | ✓ Injuries | L | ✓ Use drip trays ✓ Use funnels for fueling |
| | ✓ Spillages | ✓ Fire | ✓ Injuries | M | ✓ No smoking allowed near the generator |
| | ✓ Fuel | ✓ 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 |
| | ✓ 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 respiratory masks. ✓ Never use indoors |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

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ACTIVITY: WORKING INSIDE CONFINED SPACES (PUMP HOUSE)

| Task | Hazard | Risk | Consequence | Rating | Controls |
|-------------------------|--|--|--------------------------------------|--------|---|
| Entry inside Pump House | ✓ Slippery steps | ✓ Falling | ✓ Injuries | M | ✓ Inspect the steps prior to entering |
| | ✓ Poor lighting | ✓ Falling | ✓ Injuries | M | ✓ Ensure that there is sufficient lighting in the confined space |
| | ✓ Overhead structures | ✓ Bumping against overhead structures | ✓ Injuries | M | ✓ Train employees in confined space entry / techniques ✓ Ensure that there is sufficient lighting ✓ Provide employees with safety boots and hard hats |
| | ✓ Limited working space | ✓ Falls on equipment | ✓ Injuries | M | ✓ Train employees in confined space entry / techniques ✓ Ensure that there is sufficient lighting ✓ Provide employees with safety boots and hard hats |
| | ✓ No fire detection and suppression system | ✓ Fire | ✓ Fatalities ✓ Damage to property | H | ✓ Ensure that there is a method in place for detection and suppression of fire. ✓ Ensure that fire fighting equipment is serviced and relevant for the type of fires prevalent in the pump house |
| | ✓ No ventilation | ✓ Continued exposure to oxygen-deficient air | ✓ Suffocation | H | ✓ Ensure that there is mechanical / natural ventilation |
| | ✓ Noise | ✓ Over-exposure | ✓ Noise-induced hearing loss | M | ✓ Provide employees with hearing protection ✓ Provide rest periods for employees |
| | ✓ Holes | ✓ Falling | ✓ Injuries | M | ✓ Barricade all open holes and put relevant signage |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

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|-------------------|---|
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ACTIVITY: STEEL WORKS

| Task | Hazard | Risk | Consequence | Rating | Controls |
|---|--|--|--|----------|--|
| Offloading of steel with mobile crane | <ul style="list-style-type: none"> ✓ Untrained operator ✓ Untrained rigger ✓ SWL of crane not indicated ✓ No guide ropes to control load | <ul style="list-style-type: none"> ✓ Collapse of load onto people ✓ Uncontrollable movement of the crane | <ul style="list-style-type: none"> ✓ Serious injuries ✓ Fatalities ✓ Property damages | H | <ul style="list-style-type: none"> ✓ Ensure that the crane operator and rigger are trained and medically fit. ✓ Ensure that inspection on crane is conducted prior to use. ✓ Ensure that SWL is indicated ✓ Ensure that there is good communication and visibility between the operator and rigger. ✓ Guide ropes must be in place to control overhead loads ✓ Ensure that truck is parked in a zero-energy position and have stop blocks in place. ✓ Unauthorised persons not allowed when crane is in operation |
| Dismantling of existing steel & installation of new steel | <ul style="list-style-type: none"> ✓ Untrained personnel ✓ No PPE ✓ Poor housekeeping ✓ Defective hand tools ✓ Incorrect pushing and pulling of steel | <ul style="list-style-type: none"> ✓ Steel falling on feet and legs ✓ Trips and falls | <ul style="list-style-type: none"> ✓ Injuries | M | <ul style="list-style-type: none"> ✓ Ensure that only trained employees are dismantling the steel ✓ Ensure that employees have the relevant PPE. ✓ Ensure proper housekeeping ✓ Ensure that hand tools are used prior to use. ✓ Ensure that the pulling and pushing system is correctly done and monitored. |
| Cutting steel with a grinder | <ul style="list-style-type: none"> ✓ Grinder ✓ Faulty connection points ✓ No inspections | <ul style="list-style-type: none"> ✓ Electrocution ✓ Cuts | <ul style="list-style-type: none"> ✓ Injuries ✓ Amputation | M | <ul style="list-style-type: none"> ✓ Ensure all grinders and connections are inspected ✓ Ensure that safety guards are in place on the grinder |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

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ACTIVITY: STEEL WORKS

| Task | Hazard | Risk | Consequence | Rating | Controls |
|--|--|--|--|--------|---|
| | <ul style="list-style-type: none"> ✓ Untrained operator ✓ No PPE ✓ Damaged cutting disc | | | | <ul style="list-style-type: none"> ✓ Handle and switch of the grinder should be inspected and tested prior to use. ✓ Only trained employees may use grinders ✓ Proper PPE to be used ✓ Inspect cutting disc prior to use |
| Binding steel with wire (using nip pliers) | <ul style="list-style-type: none"> ✓ Defective tools ✓ No PPE | ✓ Cuts | ✓ Injuries | L | <ul style="list-style-type: none"> ✓ Inspect tools prior to using ✓ Ensure that the wire used to bind steel is bent at the end to prevent eye injuries ✓ Ensure that proper PPE is provided |
| Welding | ✓ Welding machine | ✓ Welding sparks | ✓ Arc eyes | M | <ul style="list-style-type: none"> ✓ Wear task specific PPE ✓ Compile safe working procedure for welding ✓ Inspection of equipment ✓ Competent employees should perform this task ✓ Place a welding and cocoon the welding site |
| | ✓ Hot Works | <ul style="list-style-type: none"> ✓ Burns to eyes or other parts of the body; ✓ | ✓ Eye injuries | M | <ul style="list-style-type: none"> ✓ Provide proper PPE (face mask, flame-proof gloves and overalls and safety shoes) |
| | ✓ Hot works | <ul style="list-style-type: none"> ✓ Fire . ✓ Explosion | <ul style="list-style-type: none"> ✓ Fatalities ✓ Property damages | H | <ul style="list-style-type: none"> ✓ Fire extinguisher readily available. ✓ Only competent persons may do hot work ✓ Provide screens where hot work is conducted. ✓ Remove all combustible materials and hazardous chemical substance from the hot work area. |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

| | |
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ACTIVITY: CONCRETE FLOOR

| Task | Hazard | Risk | Consequence | Rating | Controls |
|---|--|---------------------------------|------------------------------|--------|--|
| Breaking up existing floor | ✓ Dust | ✓ Inhalation | ✓ Respiratory illnesses | L | ✓ Employees must be provided with the dust mask. |
| Using hand tools and portable equipment | ✓ Improper placing ✓ Unstable footing | ✓ Falling on employees | ✓ Injuries | L | ✓ Provide employees with proper safety shoes. ✓ Ensure that the equipment is properly placed and balanced |
| Use of hand tools | ✓ Repetitive movements | ✓ Improper bending | ✓ Back pains | L | ✓ Training in correct posture during shovelling |
| | ✓ Distance between employees | ✓ Hitting each other with tools | ✓ Injuries | M | ✓ Ensure safe distance between employees |
| | ✓ Damaged hand tools | ✓ Contact with skin | ✓ Injuries | L | ✓ Inspect tools prior to use ✓ Provide employees with gloves |
| Compacting | ✓ Loss of grip of tools | ✓ Hitting other employees | ✓ Injuries | M | ✓ Train employees on the use of tools ✓ Provide gloves |
| Plastering | ✓ Concrete splashing | ✓ Skin contact | ✓ Dermatitis ✓ Skin burns | M | ✓ Use of skin protection ✓ Provide gloves and safety boots ✓ Have MSDS |
| | ✓ Concrete splashing | ✓ Eye contact | ✓ Eye injuries | M | ✓ Provide safety goggles |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

| | |
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ACTIVITY: CONCRETE FLOOR

| Task | Hazard | Risk | Consequence | Rating | Controls |
|--------------------------|---|--|---|----------|---|
| Storage and usage of HCS | <ul style="list-style-type: none"> ✓ Burning or fires on site ✓ Improper labelling of chemical containers | <ul style="list-style-type: none"> ✓ Property damage ✓ Accidental consumption of flammable liquids | <ul style="list-style-type: none"> ✓ Serious injuries ✓ Illnesses | M | <ul style="list-style-type: none"> ✓ 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 |
| Housekeeping | <ul style="list-style-type: none"> ✓ Poor housekeeping | <ul style="list-style-type: none"> ✓ Slip, trip and fall | <ul style="list-style-type: none"> ✓ Injuries | L | <ul style="list-style-type: none"> ✓ Keep the work area clean ✓ Do not leave tools unattended ✓ Conduct housekeeping inspections each day. ✓ Dispose all the waste generated in the correct waste skips on site/ or disposed then at the approved landfill site |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

| | |
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| PROJECT DESCR: | Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory |

ACTIVITY: LABS & KITCHEN RENOVATIONS (PLUMBING, TILING)

| Task | Hazard | Risk | Consequence | Rating | Controls |
|--------------------------|------------------------------|-----------------------------------|------------------------------|----------|---|
| Cutting | ✓ Drilling | ✓ Vibration | ✓ Damaged hearing | M | <ul style="list-style-type: none"> ✓ 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 ✓ Assess manual guide carefully to ensure correct usage of portable electrical devices. |
| | ✓ Drill bit | ✓ Cutting edges | ✓ Carpal tunnel syndrome | | |
| | ✓ Drill sharp metal fibres | ✓ Eye penetration | ✓ Cuts/ injuries | | |
| | ✓ High Noise Levels | ✓ Finger cuts | ✓ Eye irritation / blindness | | |
| | ✓ Cutting Grinder/Disc | ✓ Expose to high noise level area | ✓ Injuries | | |
| Use of hand tools | ✓ Repetitive movements | ✓ Improper bending | ✓ Back pains | L | <ul style="list-style-type: none"> ✓ Training in correct posture during shovelling ✓ Ensure safe distance between employees ✓ Inspect tools prior to use ✓ Provide employees with gloves ✓ Train employees on the use of tools ✓ Provide gloves |
| | ✓ Distance between employees | ✓ Hitting each other with tools | ✓ Injuries | M | |
| | ✓ Damaged hand tools | ✓ Contact with skin | ✓ Injuries | L | |
| | ✓ Loss of grip of tools | ✓ Hitting other employees | ✓ Injuries | M | |
| Use of cement | ✓ Cement dust | ✓ Inhalation | ✓ Respiratory problems | L | <ul style="list-style-type: none"> ✓ Provide employees with dust masks |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

| | |
|-------------------|---|
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ACTIVITY: PAINTING OF THE OFFICES / LABS

| Task | Hazard | Risk | Consequence | Rating | Controls |
|---------------------------|----------------------------|--|-------------------|--|---|
| Painting | ✓ Exposure to paint | ✓ Skin contact | ✓ Skin irritation | M | <ul style="list-style-type: none"> ✓ Wear full PPE, Eye protection, respiratory protection, safety boots and overall. ✓ Employees must wash hands before they eat ✓ Provide SDS ✓ No employees should be permitted to smoke near the paint/ the interior of the building should be kept well ventilated ✓ Everyone should be inducted on the emergency response should there be fire |
| | | ✓ Inhalation of paint | ✓ Eye irritation | | |
| | ✓ Paint (Flammable liquid) | ✓ Eye contact | ✓ Lung infections | | |
| | | ✓ Ingestion of paint | ✓ Vomiting | | |
| | | ✓ Contact with flame | ✓ Diarrhoea | | |
| | ✓ Spillage | ✓ Trip and fall | ✓ Injuries | | |
| ✓ Fumes | ✓ Inhalation | ✓ Respiratory problems | M | <ul style="list-style-type: none"> ✓ Provide employee with respiratory masks ✓ Provide SDS ✓ Ensure sufficient amount of oxygen in the room | |
| ✓ Paint fumes | ✓ Lack of oxygen | ✓ Suffocation | M | <ul style="list-style-type: none"> ✓ Ensure that doors and windows are opened to allow oxygen to enter and harmful gases and fumes to exit | |
| ✓ Ignition source /sparks | ✓ Fire | <ul style="list-style-type: none"> ✓ Burns ✓ Property damage | M | <ul style="list-style-type: none"> ✓ All sources of ignition to be removed ✓ No smoking allowed inside the room ✓ Other hazardous chemicals to be removed from the room | |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

| | |
|-------------------|---|
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ACTIVITY: INSTALLATION OF DOORS, CABINETS, FUME HOODS, BURGLARS

| Task | Hazard | Risk | Consequence | Rating | Controls |
|---|---|--|---|----------|---|
| Lifting of doors, cabinets and other materials | <ul style="list-style-type: none"> ✓ Heavy loads ✓ No proper PPE | <ul style="list-style-type: none"> ✓ Pinching ✓ Fall ✓ Handling of heavy objects | <ul style="list-style-type: none"> ✓ Finger cuts ✓ Back pain ✓ Muscle injuries if the load is too heavy | M | <ul style="list-style-type: none"> ✓ Use of correct tool for the job at hand ✓ When using spanners work away from your body ✓ Do not work in an uncomfortable/ awkward positions. ✓ Personnel should be aware of safe manual handling techniques ✓ Wear PPE, safety boots, gloves ✓ Awareness training for correct lifting methods, use of legs and not your back ✓ Ensure good housekeeping to eliminate tripping and falling hazards |
| Cutting and drilling | <ul style="list-style-type: none"> ✓ Drilling ✓ Drill bit ✓ Drill sharp metal fibres ✓ High Noise Levels ✓ Cutting Grinder/Disc ✓ | <ul style="list-style-type: none"> ✓ Vibration ✓ Cutting edges ✓ Eye penetration ✓ Finger cuts ✓ Expose to high noise level area ✓ Uncontrolled disc ✓ Electrical equipment failure ✓ Sharp window edges | <ul style="list-style-type: none"> ✓ Damaged hearing ✓ Carpal tunnel syndrome ✓ Cuts/ injuries ✓ Eye irritation / blindness ✓ Injuries ✓ Eye injuries | M | <ul style="list-style-type: none"> ✓ 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 ✓ Assess manual guide carefully to ensure correct usage of portable electrical devices. |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

| | |
|-------------------|---|
| PROJECT NUMBER: | JW 14471 |
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ACTIVITY: INSTALLATION OF DOORS, CABINETS, FUME HOODS, BURGLARS

| Task | Hazard | Risk | Consequence | Rating | Controls |
|--------------------------|------------------------------|---------------------------------|--------------|---|---|
| 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 | ✓ Injuries | 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. | |
| | ✓ Inability to move | ✓ Suffocation | | | |
| Use of hand tools | ✓ Repetitive movements | ✓ Improper bending | ✓ Back pains | L | ✓ Training in correct posture during shovelling |
| | ✓ Distance between employees | ✓ Hitting each other with tools | ✓ Injuries | M | ✓ Ensure safe distance between employees |
| | ✓ Damaged hand tools | ✓ Contact with skin | ✓ Injuries | L | ✓ Inspect tools prior to use ✓ Provide employees with gloves |
| | ✓ Loss of grip of tools | ✓ Hitting other employees | ✓ Injuries | M | ✓ Train employees on the use of tools ✓ Provide gloves |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

| | |
|-------------------|---|
| PROJECT NUMBER: | JW 14471 |
| PROJECT LOCATION: | Northern Works & Ffennell Flow Lab |
| PROJECT DESCR: | Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory |

ACTIVITY: ELECTRICAL WORKS

| Task | Hazard | Risk | Consequence | Rating | Controls |
|------------------|---|--|--|--------|--|
| Electrical works | ✓ Live electric cables | ✓ Electric Shock | ✓ Serious injuries | H | <ul style="list-style-type: none"> ✓ Ensure that electricity supply is switched off during installation ✓ Implement lockout procedures |
| | ✓ Inadequate wiring | <ul style="list-style-type: none"> ✓ Electric fault ✓ Fire | <ul style="list-style-type: none"> ✓ Serious injuries ✓ Property damages | H | <ul style="list-style-type: none"> ✓ Only competent persons to do the electrical work |
| | ✓ Use of faulty cables | ✓ Fire ignition | ✓ Burns/ damages | M | <ul style="list-style-type: none"> ✓ Visual inspection of cable before use |
| Cabling | <ul style="list-style-type: none"> ✓ Cutting | <ul style="list-style-type: none"> ✓ Eye penetration | <ul style="list-style-type: none"> ✓ Eye injuries/ blindness | M | <ul style="list-style-type: none"> ✓ Safety goggles shall be worn by employees when cutting steel |
| | ✓ Unit activation | ✓ Struck by equipment | ✓ Injuries | M | <ul style="list-style-type: none"> ✓ Lock out/ Tag out |
| | ✓ Live Yard | <ul style="list-style-type: none"> ✓ Electrocution Injury ✓ Working unauthorized ✓ Miscommunication between employees | ✓ Injury or death | H | <ul style="list-style-type: none"> ✓ Obtain a permit ✓ Follow cardinal rules ✓ Strict supervision ✓ Fire extinguisher must always be on site ✓ Obtain a permit and follow all procedures listed ✓ Strict supervision ✓ Competent technician operation ✓ Issue test certificate for every testing and inspection done |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

| | |
|-------------------|---|
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| PROJECT LOCATION: | Northern Works & Ffennell Flow Lab |
| PROJECT DESCR: | Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory |

ACTIVITY: ELECTRICAL WORKS

| Task | Hazard | Risk | Consequence | Rating | Controls |
|------|--|--|---|----------|---|
| | <ul style="list-style-type: none"> ✓ Electrical connection ✓ Extension cords | <ul style="list-style-type: none"> ✓ Explosion ✓ Faulty cord failure | <ul style="list-style-type: none"> ✓ Injuries / damage to equipment ✓ fire | L | <ul style="list-style-type: none"> ✓ Emergency stop button must always be serviceable ✓ Fire extinguishers must always be kept on site |
| | <ul style="list-style-type: none"> ✓ Electrical equipment ✓ Portable electrical appliances | <ul style="list-style-type: none"> ✓ Use of faulty electrical equipment; ✓ Faulty equipment could also start a fire. | <ul style="list-style-type: none"> ✓ fatal shocks or burns. ✓ Electric shock/ burns ✓ injuries | M | <ul style="list-style-type: none"> ✓ All tools to be checked and tagged before bringing onto site; ✓ Portable electrical appliances examined and where necessary, tested by a competent person within the recommended time limit; ✓ Defective appliances and leads are removed from use and kept secured until they can be repaired or removed from the site; ✓ Electric tools and installations to be in good condition; ✓ Inspect electric tools before use; ✓ Do not use electric tools in wet / damp conditions; ✓ Use personal protective equipment such as insulated gloves. |
| | <ul style="list-style-type: none"> ✓ Testing ✓ Inspection | <ul style="list-style-type: none"> ✓ Electrocution ✓ Injury /Damage to equipment ✓ Chocking | <ul style="list-style-type: none"> ✓ Fatalities ✓ Property damages | H | <ul style="list-style-type: none"> ✓ Authorized person with COC must do all the installation ✓ Emergency stop button must always be serviceable |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

| | |
|-------------------|---|
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ACTIVITY: ELECTRICAL WORKS

| Task | Hazard | Risk | Consequence | Rating | Controls |
|------|--------|--|-------------|--------|---|
| | | <ul style="list-style-type: none"> ✓ Electrocutation Injury ✓ Working unauthorized ✓ Miscommunication between employees | | | <ul style="list-style-type: none"> ✓ Ensure communication between employees ✓ Technical Skills ✓ Fire extinguisher must always be on site ✓ Implement lockout procedure ✓ Strict supervision ✓ Competent technician operation |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

| | |
|-------------------|---|
| PROJECT NUMBER: | JW 14471 |
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ACTIVITY: GENERAL ACTIVITIES ON SITE

| Task | Hazard | Risk | Consequence | Rating | Controls |
|----------------------------|-----------------------------------|---|--|----------|---|
| ✓ Working on site | ✓ Unhappy community | <ul style="list-style-type: none"> ✓ Community coming to survey site ✓ Violence against employees | <ul style="list-style-type: none"> ✓ Property damages ✓ Serious injuries | H | <ul style="list-style-type: none"> ✓ Develop an emergency response procedure ✓ Meet with the community and all stakeholders prior to commencement of the project ✓ Have the contact details of the nearest police station / JMPD offices |
| | ✓ Unfavourable weather conditions | <ul style="list-style-type: none"> ✓ Exposure to temperature extremes | <ul style="list-style-type: none"> ✓ Heat exhaustion ✓ Frost bite | M | <ul style="list-style-type: none"> ✓ Provide employees with water for cooling down. ✓ Provide employees with warm jackets and gloves during winter ✓ Provide 5-minute rest periods for every 30 minutes of exposure to temperature extremes. ✓ No work to be undertaken in rainy conditions |
| | ✓ Housekeeping | <ul style="list-style-type: none"> ✓ Trips and falls | <ul style="list-style-type: none"> ✓ Injuries | M | <ul style="list-style-type: none"> ✓ Ensure that proper housekeeping is maintained on site at all times. |
| ✓ Working near open spaces | ✓ Snakes | <ul style="list-style-type: none"> ✓ Bites ✓ Poisoning | <ul style="list-style-type: none"> ✓ Fatalities ✓ Serious injuries | H | <ul style="list-style-type: none"> ✓ Inspect the area for snakes prior to entering ✓ Conduct snake awareness training ✓ Know the do's and don'ts of what to do when coming across snakes |
| | ✓ Bees | <ul style="list-style-type: none"> ✓ Bites | <ul style="list-style-type: none"> ✓ Allergic reaction | M | <ul style="list-style-type: none"> ✓ Inspect the area for bees / wasps prior to entering ✓ Conduct bees awareness training ✓ Know the do's and don'ts of what to do when coming across bees |
| | ✓ Sharp objects | <ul style="list-style-type: none"> ✓ Getting pricked by sharp objects | <ul style="list-style-type: none"> ✓ Tetanus ✓ Injuries | M | <ul style="list-style-type: none"> ✓ All employees to get Tetanus vaccination. ✓ Provide employees with proper safety boots |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

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ACTIVITY: GENERAL ACTIVITIES ON SITE

| Task | Hazard | Risk | Consequence | Rating | Controls |
|-------------------|----------------------------------|--|--|--------|--|
| | ✓ Criminals | ✓ Getting mugged | ✓ Loss of personal possession | M | <ul style="list-style-type: none"> ✓ Personal belongings such as phones and car keys to be safely put in pockets while working. ✓ Employees to report any suspicious activities to the local police. ✓ Equipment to be safely stored while not in use |
| | ✓ Criminals | ✓ Employees being attacked | <ul style="list-style-type: none"> ✓ Injuries ✓ Fatalities | H | <ul style="list-style-type: none"> ✓ Ensure that employees do not work in isolation. ✓ Employees to report any suspicious activities to the local police. ✓ Develop an emergency response procedure |
| ✓ Working on site | ✓ Open excavations (other works) | ✓ Falling inside | ✓ Injuries | M | <ul style="list-style-type: none"> ✓ Employees to be vigilant while working on site |
| | ✓ Water bodies | ✓ Falling inside | <ul style="list-style-type: none"> ✓ Serious injuries ✓ Fatalities | H | <ul style="list-style-type: none"> ✓ Employees to be vigilant while working on site ✓ Emergency procedures to be developed |
| | ✓ Rotating equipment | <ul style="list-style-type: none"> ✓ Entrapment ✓ Getting caught by | <ul style="list-style-type: none"> ✓ Serious injuries ✓ Fatalities | H | <ul style="list-style-type: none"> ✓ Ensure that machinery is isolated or locked out while working on it. |
| | ✓ Wastewater | <ul style="list-style-type: none"> ✓ Skin contact ✓ Ingestion ✓ Splashing into eyes | <ul style="list-style-type: none"> ✓ Waterborne diseases | H | <ul style="list-style-type: none"> ✓ Provide employees with proper PPE, and ensure that the mouth, nose and eyes are covered. ✓ Vaccinate employees and ensure that they are medically fit to work in confined spaces. |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

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ACTIVITY: GENERAL ACTIVITIES ON SITE

| Task | Hazard | Risk | Consequence | Rating | Controls |
|--|--|---|--|----------|--|
| Working near roads inside the Works | <ul style="list-style-type: none"> ✓ Moving vehicles and pedestrians ✓ Speeding ✓ No signage ✓ Improperly placed signage | <ul style="list-style-type: none"> ✓ Road accidents ✓ People getting knocked down by cars | <ul style="list-style-type: none"> ✓ Fatalities ✓ Serious injuries ✓ Property damages | M | <ul style="list-style-type: none"> ✓ Adhere to traffic management procedures ✓ Ensure good communication between flagmen ✓ Obey speed limits ✓ Display correct road signage ✓ Employees should wear reflective PPE . ✓ Keep area clean & clear of obstacles. |
| Using hand tools and portable equipment | <ul style="list-style-type: none"> ✓ Improper placing ✓ Unstable footing | <ul style="list-style-type: none"> ✓ Falling on employees | <ul style="list-style-type: none"> ✓ Injuries | L | <ul style="list-style-type: none"> ✓ Provide employees with proper safety shoes. ✓ Ensure that the equipment is properly placed and balanced |
| Use of hand tools | <ul style="list-style-type: none"> ✓ Repetitive movements | <ul style="list-style-type: none"> ✓ Improper bending | <ul style="list-style-type: none"> ✓ Back pains | L | <ul style="list-style-type: none"> ✓ Training in correct posture during shovelling |
| | <ul style="list-style-type: none"> ✓ Distance between employees | <ul style="list-style-type: none"> ✓ Hitting each other with tools | <ul style="list-style-type: none"> ✓ Injuries | M | <ul style="list-style-type: none"> ✓ Ensure safe distance between employees |
| | <ul style="list-style-type: none"> ✓ Damaged hand tools | <ul style="list-style-type: none"> ✓ Contact with skin | <ul style="list-style-type: none"> ✓ Injuries | L | <ul style="list-style-type: none"> ✓ Inspect tools prior to use ✓ Provide employees with gloves |
| | <ul style="list-style-type: none"> ✓ Loss of grip of tools | <ul style="list-style-type: none"> ✓ Hitting other employees | <ul style="list-style-type: none"> ✓ Injuries | M | <ul style="list-style-type: none"> ✓ Train employees on the use of tools ✓ Provide gloves |



OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION: BASELINE RISK ASSESSMENT

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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 |

JOHANNESBURG WATER (SOC) LTD

MEDICAL SCREENING POLICY

**JW 14471: SEALING OF THE LEAKING
CONCRETE WATER SUMP AT THE FLOW
LABORATORY AND RENOVATION OF THE**

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~~ Uncontrolled when Printed

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

| | | |
|---|---|---|
|  Johannesburg Water | OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION | |
| | PROJECT NUMBER: | JW 14471 |
| | PROJECT LOCATION: | Northern Works & Ffennell Flow Lab |
| | PROJECT DESCR: | Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory |

VOLUME 2

Occupational Health & Safety Specification

JW 14471

SEALING OF THE LEAKING CONCRETE WATER SUMP AT THE FLOW LABORATORY AND RENOVATION OF THE NORTHERN WORKS LABORATORY

| | | |
|---|------------------------------|--|
| Prepared by: OHS Department 65 Ntemi Piliso Street Newtown 2000 Tel: +27 11 688 1476 | PRINCIPAL CONTRACTOR: | |
| | CEO (16.1 APPOINTEE): | |
| | TELEPHONE NUMBER: | |
| | FAX NUMBER | |
| | E-MAIL ADDRESS: | |
| | SIGNATURE: | |

| | | |
|---|---|---|
|  Johannesburg Water | OCCUPATIONAL HEALTH & SAFETY (OHS) SPECIFICATION | |
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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 |

| | | |
|---|---|---|
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| | |
|------|----------------------------------|
| SANS | South African National Standards |
| SABS | South African Bureau Standard |
| SOC | State Owned Company |

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: <ol style="list-style-type: none"> The construction, erection, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure 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 1 (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). |

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| 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. |

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 (Mandatory) 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 / Mandatory.

The dual objective of this specification is to ensure that the Mandatory and Principal Contractors (herein after called Principal Contractor (including Mandatory)) 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, mandatory 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, Mandatory, 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);

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- 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 of/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;
- 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

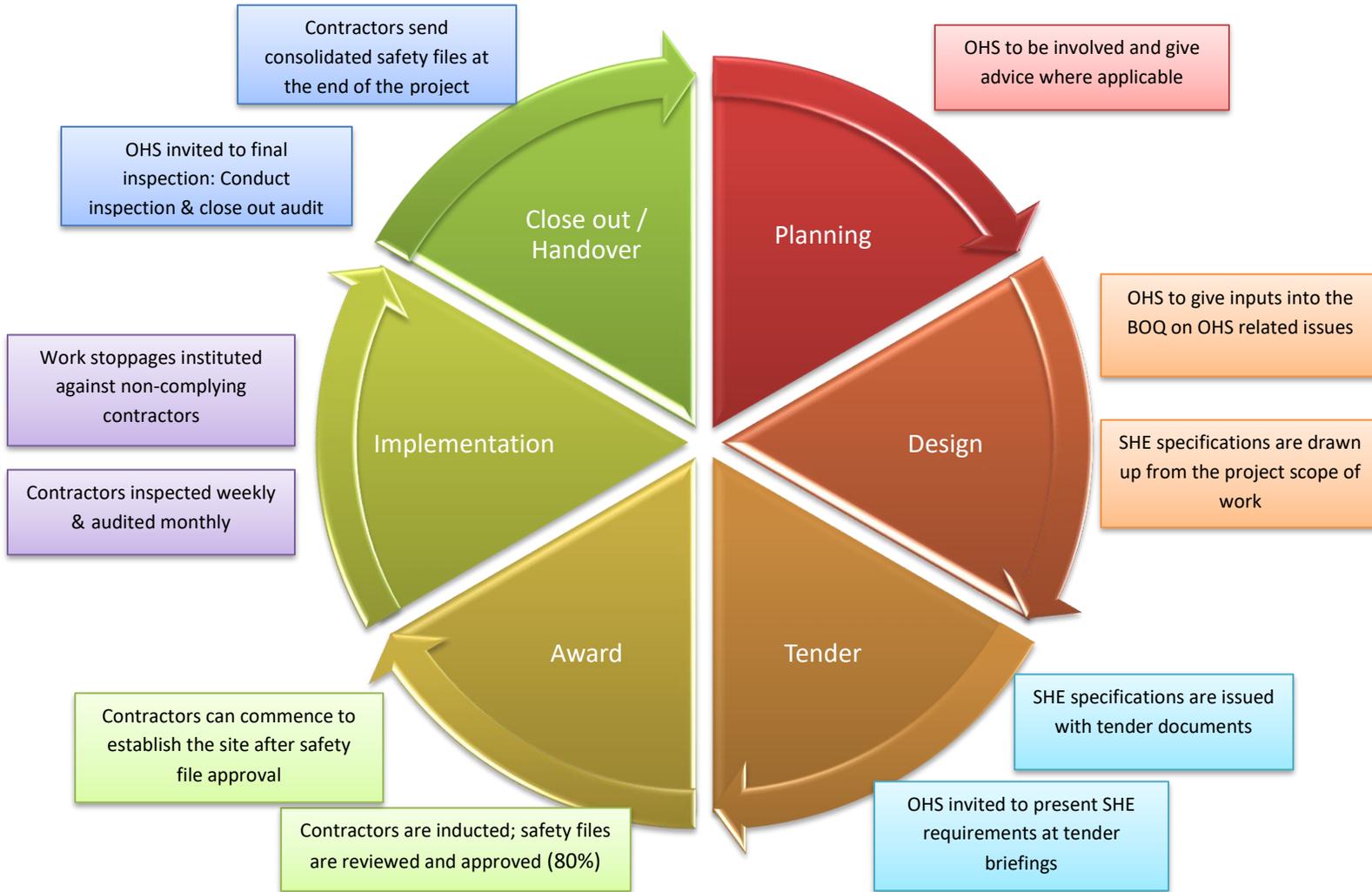
The contractor management process consists of the following phases:

- 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; COID 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:

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- a) Prepare a site specific SHE file based on client SHE specification and project scope.
- 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.

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- It is the responsibility of the contractor to ensure that there are 37(2) agreements between themselves and all their appointed sub-contractors.

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 (COID)
- 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**.

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- 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.

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 |

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| 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 |

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

- There will not be a requirement for submitting a notification of construction work to Department of Employment and Labour.
- The Construction Work Permit will be applicable instead.

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2.13 Construction work permit

- There will be a requirement for a construction work permit for this based on the number of days on site as well as project value.
- 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;

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- A plan to monitor the application of the Safe Working Procedures (SWP);
- 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

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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 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

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- Incident investigation
- Risk Assessment
- Planned job observations (supervisors)
- Emergency planning and coordination
- Incident investigation
- Risk Assessment
- Formwork
- Steel fixing
- Working at heights
- Confined space entry
- Fall protection planning

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

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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.

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.

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- 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 with reflective strips;
- Safety boots (Steel toe cap with steel midsole or equivalent)
- Safety vests
- Protective headwear; and
- Eye, face and ear protection.
- Safety harness
- Gloves
- 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 Stakeholder Relations Specialist will be the link between Johannesburg Water SOC Ltd and the community to ensure relevant responsibilities are fulfilled and positive relationships with the community are maintained.

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- 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.
- Where roads will be closed proper signage including the following will be posted:
 - Road closed
 - Detour
 - Keep left / right
 - Slow down
 - Deep excavation
 - Delineator
 - Road work ahead

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.
- 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

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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.
- 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 |

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| | | |
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| 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.

| 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 |

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| NR | DESCRIPTION OF AUDIT NON-CONFORMANCE / NON-COMPLIANCE |
|----------|---|
| 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 |
| | Non-conformance closure | Principal Contractor / Contractor |
| Compliance rating: 60-79% | 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 |

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| CRITERIA | ACTION TO BE INSTITUTED | RESPONSIBLE PARTY |
|---------------------------------|--|-----------------------------------|
| 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.
- 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.
- 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 an unexpected collapse of the excavation
 - After substantial damage to any supports
- 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.

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- All pipes, ducts etc. that may leak into the confined space to be blanked off sufficiently to prevent any leakage or seepage.
- 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 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.

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- 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.
- 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

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- 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.
- 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 SIGNGAGE

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.

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- 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.
- 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

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- 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;
- 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 on site

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:

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- 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.
- 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.

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- 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.

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 TRAFFIC MANAGEMENT

- The contractor must adhere to traffic rules on the roads and within JW premises at all times.

20.13 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.

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- 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

20.14 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.

20.15 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).

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;

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- 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:

- 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.

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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 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)

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- 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.

20.16 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.

20.17 CONSTRUCTION VEHICLES AND MOBILE PLANT

- Not applicable

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.

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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.

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

- Not applicable

20.22 Bulk mixing plants (Batch plants)

- Not applicable

20.23 Working in proximity to Eskom power lines

- Not applicable

20.24 Horizontal Drilling

- Not applicable

20.25 Pipe jacking / tunnelling

- Not applicable

20.26 WATER ENVIRONMENTS

- Not applicable

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20.27 Electrical installations

The installation of temporary electricity for construction shall be in accordance with Construction Regulations and the Electrical Installation Regulations. The Principal Contractor must ensure that:

- Existing services are located and marked before construction commences and the markings maintained during construction;
- Electrical installations and -machinery are sufficiently robust to withstand normal working conditions on site;
- Temporary electrical installations must be inspected at least once a week by a competent person and a record of the inspections kept in the SHE File;
- Electrical machinery used on a construction site must be inspected daily before start-up by the competent driver/operator or any other competent person and a record of the inspections kept in the SHE File; and
- A competent person appointed in writing must control and be responsible for all temporary electrical installations.
- An employer or user shall provide free of charge and maintain in good condition such protective equipment as may be necessary to prevent incidents, for use by persons engaged in working on or in close proximity to live electrical machinery or dead electrical machinery which may become live.

20.27.1 Electrical control gear

- The contractor shall ensure that all electrical machinery are provided with controlling apparatus and protective devices which shall, as far as is reasonably practicable, be capable of automatically isolating the power supply in the event of a fault developing on such machinery.
- The contractor shall place a switch, circuit breaker or fuse in the neutral conductor of a polyphase alternating current or three-wire direct current distribution system unless such switch, circuit breaker or fuse is so arranged as to isolate all phase conductors and the neutral conductor simultaneously: Provided that this shall not include an isolating link on the neutral conductor installed for test purposes or to prevent circulating currents.
- The contractor shall, whenever reasonably practicable, provide switchgear with an interlocking device so arranged that the door or cover of the switch cannot be opened unless the switch is in the 'off position and cannot be switched on unless the door or cover is locked.
- The contractor shall mark or label all controlling apparatus permanently so as to identify the system or part of the system or the electrical machinery which it controls, and where such control apparatus is accessible from the front and the back these markings shall be on both the front and the back.
- The contractor shall post a notice at switchgear or control gear which has been switched off or locked out to enable persons to work on electrical machinery or other machinery operated by electricity and controlled by. Such switchgear or control gear, warning against reclosing such switchgear or control gear.

20.27.2 Work on disconnected electrical machinery

- Without derogating from any specific duty imposed on employers or users of machinery by the Act, an employer or user shall, whenever work is to be carried out on any electrical machinery which has been disconnected from all sources of electrical energy, but which is liable to acquire or to retain an electrical charge, as far as is practicable, cause precautions to be taken by earthing or other means to discharge the electrical energy to earth from such electrical machinery or any adjacent electrical machinery if there is danger there from before it is handled and to prevent any electrical machinery from being charged or made live while persons are working thereon

20.27.3 Portable electric tools

No person shall use or permit the use of a portable electric tool with an operating voltage that exceeds 50 V to earth unless-

- It is connected to a source of electrical energy incorporating an earth leakage protection device, the construction of which meets the requirements of the relevant health and safety standard incorporated into these Regulations under section 44 of the Act; or
- It is connected to a source of electrical energy through the interposition between each tool and the source of an individually double-wound isolating transformer, the secondary winding of which is not earthed at any point

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and the construction of which meets the requirements of the relevant health and safety standard incorporated into these Regulations under section 44 of the Act; or

- It is connected to a source of high frequency electrical energy derived from a generator which is used solely for supplying energy to such portable electric tool and which arrangement is approved by the chief inspector; or it is clearly marked that it is constructed with double or reinforced insulation.

No person shall sell a portable electric tool constructed with double or reinforced insulation unless-

- It is clearly marked that it is constructed with such insulation; and Its insulation is constructed in accordance with the relevant health and safety standard incorporated into these Regulations under section 44 of the Act.
- No employer or user shall use or permit the use of a portable electric tool which is not fitted with a switch to allow for easy and safe starting and stopping of the tool.
- The employer or user shall maintain every portable electric tool, together with its flexible cord and plug, in good working order.

20.27.4 Switchboards

The contractor shall ensure that an unobstructed space for operating and maintenance staff is provided at the back and front of all switchboards, and the space at the back shall be kept closed and locked except for the purpose of inspection, alteration or repair: Provided that the requirements of this regulation with respect to the unobstructed space at the back of the switchboard shall not apply in the case of-

- switchboards which have no uninsulated conductors accessible from the back;
- switchboards, the switchgear of which is of a totally enclosed construction;
- switchboards, the backs of which are only accessible through an opening in the wall or partition against which they are placed, such openings being kept closed and locked; and
- switchboards which can be safely and effectively maintained from the front and which have all parts accessible from the front.

20.27.5 Electrical machinery in hazardous locations

- No person may use electrical machinery in locations where there is danger of fire or explosion owing to the presence, occurrence or development of explosive or flammable articles, or where explosive articles are manufactured, handled or stored, unless such electrical machinery, with regard to its construction relating to the classification of the hazardous locations in which it is to be used, meets the requirements of a safety standard incorporated for this purpose in these regulations under section 36 of the Act.
- Every user of electrical machinery shall be in possession of a certificate in a form acceptable to the chief inspector which has been issued by an approved inspection authority, in which it is certified that the electrical machinery has been manufactured and tested for the groups of dangerous articles in terms of the safety standard which has been incorporated in these regulations for this purpose under section 36 of the Act: Provided that in lieu of such certificate an inspector may approve permanent labeling on such machinery which contains all the relevant information.
- When diverse items of electrical machinery such as motors, cables and control apparatus are used together to form an electrical installation, the user shall ensure that the selection, arrangement, installation, protection, maintenance and working thereof results in no less a degree of safety than when the individual items of such machinery are used separately.
- The user shall use electrical machinery to which this regulation applies only under such conditions and in such surroundings as are prescribed in the safety standard incorporated in these regulations for this purpose under section 36
- No person shall effect repairs or adjustments to or otherwise work on electrical machinery under conditions (bullet 1) unless such machinery has been rendered dead and effective measures have been taken to ensure that such machinery remains dead.
- Wherever there is a possibility of the formation of static electricity under working conditions, the user shall earth all metallic structures, machine parts, pneumatic conveyor ducts and pipelines conveying flammable

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articles and the like, or take such other measures as may be necessary to effectively prevent the formation of electric sparks.

- The user shall cause all electrical machinery to which this regulation applies to be examined and tested at intervals not exceeding two years by a person who is competent to express an opinion on the safety thereof.
- The person carrying out the examination shall enter, sign and date the results of each such examination in a record book which shall be kept by the user for this purpose: Provided that where such machinery is subject to adverse climatic or physical conditions the frequency of such examinations shall be increased to intervals of no longer than one year or such shorter period as circumstances may necessitate.

20.27.6 Design and construction

- No person shall authorize, design, install or permit or require the installation of an electrical installation, other than in accordance with a health and safety standard incorporated into these regulations under section 44 of the Act: Provided that the components within an electrical installation shall comply with the standards referred to in the incorporated standard and proof of compliance shall be identifiable on the components or certification shall be available from the supplier or manufacturer of the components: Provided further that items of an electrical installation not covered by such incorporated safety standard, and the conductors between the point of supply and the point of control, shall be installed in accordance with the by-laws or regulations of the supplier concerned.
- A registered person shall exercise general control over all electrical installation work being carried out, and no person shall allow such work without such control: Provided that where the voltage exceeds 1kV, the installation shall be designed and supervised by a person deemed competent in terms of paragraphs (b), (c) or (d) of the definition of a competent person in regulation 1 of the General machinery Regulations, 1998.
- No supplier shall restrict the application of a health and safety standard referred to in sub-regulation (1) when an electrical installation is installed, except where the distribution system of the supplier may be adversely affected by the application thereof.

20.27.7 Electrical contractor

- Any person, including a juristic person, who intends to do installation work as an electrical contractor shall register annually with the chief inspector in the form prescribed in annexure 1 of the Electrical Installations Regulations.

20.27.8 Commencement and permission to connect installation work

- No person shall commence with installation work which would require a new supply or an increase in electricity supply capacity unless the supplier has been notified thereof in the form of Annexure 3: Provided that the supplier may waive this requirement in respect of such types of work as it may specify.
- No person shall connect or permit the connection of any completed or partially completed electrical installation to the electricity supply unless it has been inspected and tested by a registered person and a certificate of compliance for that electrical installation has been issued: Provided that the supplier may on request connect the supply to the installation for the purpose of testing and completion of the certificate of compliance by a registered person: Provided further that this sub-regulation shall not apply in the case where the electricity was disconnected for the non-payment of the electricity account or where there has been a change of tenant but not of ownership.
- Where the supply to an electrical installation is 25kVA or above, the user shall appoint an approved inspection authority or a competent person who shall ensure the compliance from the commencement to the commissioning of the installation.

20.27.9 Issuing of certificate of compliance

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Only registered person may issue a certificate of compliance in the form of annexure 4 and which shall be accompanied by a test report in the format approved by the chief inspector, after having satisfied himself or herself by means of an inspection and testing that—

- a new electrical installation complies with the provisions of regulation 7 (1) of the Electrical Installation Regulations (EIR); or
- an electrical installation which existed prior to the publication of the current edition of the health and safety standard incorporated into these regulations in terms of regulation 7 (1) (EIR), complies with the general safety principles of such standard; or
- an electrical installation which existed prior the publication of the current edition of the health and safety standard incorporated into these regulations in terms of regulation 7 (1) and to which extensions or alterations have been affected, that—
 - ting part of the installation, complies with the general safety principles of such standard and is reasonable safe, and
 - extensions or alterations affected comply with the provisions of regulation 7 (1) of the Electrical Installation Regulations (EIR).
- If at any time prior to issuing a certificate of compliance any fault or defect is detected in any part of the installation, the registered person shall refuse to issue such certificate: Provided that if such fault or defect in the opinion of the registered person constitutes an immediate danger to persons in the case where electricity is already supplied, he or she shall forthwith take steps to disconnect the supply to the circuit in which the fault or defect was detected and notify the chief inspector.
- Any person who undertakes to do electrical installation work shall ensure that a valid certificate of compliance is issued for that work.

No person shall amend a certificate of compliance issued by a registered person

20.28 Welding, flame cutting, soldering and similar operations

1. No contractor shall require or permit welding or flame cutting operations to be undertaken, unless -

- the person operating the equipment has been fully instructed in the safe operation and use of such equipment and in the hazards which may arise from its use;
- effective protection is provided and used for the eyes and respiratory system and, where necessary, for the face, hands, feet, legs, body and clothing of persons performing such operations, as well as against heat, incandescent or flying particles or dangerous radiation;
- leads and electrode holders are effectively insulated; and
- the workplace is effectively partitioned off where practicable and where not practicable all other persons exposed to the hazards contemplated in bullet two are warned and provided with suitable protective equipment.

2. No contractor shall require or permit welding or flame cutting operations to be undertaken in a confined space, unless:

- effective ventilation is provided and maintained; or
- masks or hoods maintaining a supply of safe air for breathing are provided and used by the persons performing such operations.

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3. No contractor shall require or permit electric welding to be undertaken in wet or damp places, inside metal vessels or in contact with large masses of metal, unless --

- the insulation of the electrical leads is in a sound condition;
- the electrode holder is completely insulated to prevent accidental contact with current-carrying parts;
- the welder is completely insulated by means of boots, gloves or rubber mats; and
- at least one other person who has been properly instructed to assist the welder in case of an emergency is and remains in attendance during operations: Provided that the provisions of this sub-regulation shall not apply to a welding process where the maximum voltage to earth does not exceed 50 volts.

4. No contractor shall require or permit welding, flame cutting, grinding, soldering or similar work to be undertaken in respect of any tube, tank, drum, vessel or similar object or container where such object or container --

- is completely closed, unless a rise in internal pressure cannot render it dangerous; or
- contains any substance which, under the action of heat, may --
 - (i) ignite or explode; or
 - (ii) react to form dangerous or poisonous substances,

unless a person who is competent to pronounce on the safety thereof has, after examination, certified in writing that any such danger has been removed by opening, ventilating or purging with water or steam, or by any other effective means.

(5) Where hot work involving welding, cutting, brazing or soldering operations is carried out at places, other than workplaces which have been specifically designated and equipped for such work, the employer shall take steps to ensure that proper and adequate fire precautions are taken.

20.29 Tunnelling

No person may enter a tunnel, which has a height dimension of less than 800 millimetres.

20.30 Asbestos work

- Not applicable

20.31 Earthing

The contractor shall ensure that -

- roofs, gutters, downpipes and waste pipes on premises to which electrical energy is supplied to be earthed, except -
 - where the operating voltage does not exceed 50 V;
 - roofs made of non-conductive material or metal roofs covered by non-conductive material;
 - gutters, downpipes and waste pipes made of non-conductive material or gutters and downpipes attached to a metal roof which is covered by non-conductive material;
 - roofs, gutters, downpipes and waste pipes on premises which receive electricity by means of underground service connections:

Provided that the connection is to the conductive structures;

- all accessible metallic parts of electrical machinery that, though normally not forming part of an electrical circuit, may become live accidentally, to be protected by an insulating covering or to be otherwise enclosed or to be earthed and the resistance of the earth continuity path shall not exceed 0,2 ohm, except-
 - metal in earth-free situations, other than runs of metal wireway, and the close-fitting metal sheathing and armouring of cables;

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- short separate lengths of heavy-gauge metal wireway used for the mechanical protection of cables where such cables are not used in the secondary circuits of discharge luminaire installations;
- short, unexposed separate lengths of metal wireway used for the mechanical protection of insulated wiring passing through walls, floors, partitions or ceilings;
- metalwork of fixed electrical machinery where such metalwork is more than 2.4 m above the floor: Provided that this exception shall not apply where such metalwork is situated in any position likely to become damp, or in an elevator shaft, or near rotating machinery, or in contact with a wall, ceiling or other support constructed of or covered with conducting material;
- metal parts of electrical machinery where such parts are enclosed or shrouded by insulating material so that such metal parts cannot be touched;
- cleats, clips, saddles, clamps of other devices for fixing wireways and cables;
- shades, reflectors and guards supported on lamp holders or discharge luminaires;
- lamp caps;
- metal parts of or screws in or through non-conducting materials which are separated by such materials from current-carrying parts and from earthed non-current-carrying parts in such a way that in normal use they cannot become live or come into contact with earthed parts.

20.32 Noise

Where noise is identified as a hazard the requirements of the NIHL regulations must be complied with and the following must be included / referred to in the Health and Safety Plan.

- Proof of training with regards to these regulations.
- That monitoring carried out by an AIA and done according to SABS 083.
- Medical surveillance programme is established and maintained for the necessary employees.
- Control of noise by means of:
 - Engineering methods considered
 - Admin control considered
 - Personal protective equipment considered/decided on
 - Describe how records are going to be kept for 40 years.

20.33 Demolition

- Not applicable

21. 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

22. 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.
- The documents shall be submitted in an electronic format, preferably a memory stick or a downloadable link
- The contractor shall also ensure that the site is left in a safe manner that cannot cause injury or harm to JW employees or third parties.

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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 | SURNAME | DATE | SIGNATURE |
| | | | |
| CONTRACT SUPERVISOR | | | |
| NAME | SURNAME | DATE | SIGNATURE |
| | | | |
| WITNESS (1) | | | |
| NAME | DESIGNATION | DATE | SIGNATURE |
| | | | |
| WITNESS (2) | | | |
| NAME | DESIGNATION | DATE | SIGNATURE |
| | | | |

OHS CONTRACTORS' MANAGEMENT SYSTEM**TENDER DOCUMENT SHE SPECS SIGN-OFF FORM**

REQUESTED BY Muhammad Malik

DATE

03/12/2024

JW 14471**JW 14471: Sealing of the leaking concrete water sump at the flow laboratory and renovation of the Northern Works laboratory****LIST OF SHE SYSTEM ATTACHED TO THE TENDER DOCUMENT**

| SHE SYSTEM ATTACHED | Y/N | VERSION | NO PAGES | REMARKS |
|---|------------|----------------|-----------------|-----------------------------|
| Volume 2 SHE Specification & Acknowledgement Form | Y | V2 – 09/16 | 45 | For info |
| Baseline Risk Assessment | Y | V01 – 05/15 | 21 | For info |
| Medical Screening Policy | Y | V01 – 05/15 | 8 | For info |
| Returnable Annexure A | Y | V02 - 02/20 | 1 | Return with tender document |