SANBI
Biodiversity for Life
South African National Biodiversity Institute

THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE (SANBI)

Contract No: SANBI: G506/2023

APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS
PROCUREMENT DOCUMENT

February 2024

Issued by:

The South African National Biodiversity Institute
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Name of tenderer: .....

Address: .....

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

Email: .....

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PART T: TENDER INFORMATION
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PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

Advertising date:	13 February 2024	**Closing date:**	7 March 2024
Closing time:	11:00	**Validity period:**	**90 days**

T1.1 Tender Notice and Invitation to Tender

- It is estimated that tenderers should have a **CIDB contractor grading of 3ME or higher**.
- Tender documents will be available as from 13 February 2024 and will be available ONLINE ONLY on the SANBI website www.sanbi.org (click on “Opportunities”).

A **compulsory** site briefing session will take place on **22 February 2024** starting from **10:00** at the Lowveld National Botanical Garden. Only one representative per service provider will be allowed to attend the scheduled compulsory site briefing session. Bidders are encouraged to direct all technical and bidding procedure enquiries to the email addresses below.

Department:	Supply Chain Management
Email:	sanbi.tenders@sanbi.org.za
cc:	sizwe@virtualconsulting.co.za
Cut-off date for enquiries:	**1 March 2024**

Any queries regarding the tender document or any related matter prior to submission of tenders must be directed to:

SANBI Representative (Technical Queries Only)	Mr. Sizwe Phakathi Tel: +27 11 704 0447 E-mail: sizwe@virtualconsulting.co.za
SANBI Supply Chain Management:	sanbi.tenders@sanbi.org.za

The closing time and date for the receipt of Tenders is **11:00** on **7 March 2024**.

The Tenders will **NOT** be opened in public (please note that the two-envelope system is being followed). Requirements for sealing, addressing, delivery, opening, and assessment of Tenders are stated in the Tender Data.

PART T: TENDER INFORMATION
Part T1: Tendering Procedures

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

T1.2 Tender Data

The conditions of tender are the Standard Conditions of Tender as contained in Annex C of the CIDB Standard for Uniformity in Engineering and Construction Works Contracts – 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.

Clause number	Tender Data
C.1.1	**The Employer is:** The South African National Biodiversity Institute Biodiversity Centre 2 Cussonia Avenue Brummeria Pretoria Private Bag X101 Silverton 0184
C.1.2	The Tender Documents issued by the Employer comprise the following documents: **PART T: TENDER INFORMATION** **Part T1: Tendering procedures** T1.1 - Tender notice and invitation to tender T1.2 - Tender data **Part T2: Returnable documents** T2.1 - List of returnable documents T2.2 - Returnable documents/Schedules **PART C: THE CONTRACT** **Part C1: Agreements and Contract data** C1.1 - Form of offer and acceptance C1.2 - Contract data C1.3 - Form of Construction Guarantee C1.4 - Occupational Health & Safety Agreement 37(2) **Part C2: Pricing Data** C2.1 - Notes to tenderer C2.2 - Bill of Quantities

Clause number	Tender Data
	Part C3: Scope of Works C3.1 - Description of the works C3.2 - Specifications C3.3 - Drawings **Part C4: Site Information** C4.1 - General site information C4.2 - Annexure F: Occupational Health and Safety Specification for Contractors who are on Contract with SANBI C4.3 - Annexure G: General Environmental Specification
C.1.4	The employer's agent is: **VIRTUAL CONSULTING ENGINEERS VCE (PTY) LTD** Suite 1 Groenkloof Forum Office Park, 57 George Storrar Drive, Pretoria, Gauteng, 0181 Contact person: Sizwe Phakathi Tel: +27 12 452 0444 Email: sizwe@virtualconsulting.co.za
C.1.6.1	Contract will be awarded to the tenderer who achieved highest number of points on the price and specific goals.
C.1.6.2	A competitive negotiation procedure will not be followed.
C.1.6.3	A two stage-system will be followed.
C.2.1	Only those tenderers who score the minimum score in respect of the quality criteria stated in C.3.11.1 of this Tender Data shall be considered responsive and have their tenders evaluated further. (a) CIDB registration Only those tenderers who are registered with the CIDB, or are 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, or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations, for a **3ME or higher** class of construction work, are eligible to have their tenders evaluated. Joint ventures are eligible to submit tenders provided that: 1. every member of the joint venture is registered with the CIDB; 2. the lead partner has a contractor grading designation in the **3ME or higher** class of construction work; and the combined contractor grading designation calculated in accordance with the Construction Industry Development Regulations is equal to or higher than a contractor grading designation determined in accordance with the sum tendered for a **3ME or higher** class of construction work or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations.
C.2.7	The arrangements for a compulsory clarification meeting are as stated in the Tender Notice and Invitation to Tender.
C.2.8	The last date for request for clarifications will be on 1 March 2024.
C.2.12	Replace contents: Alternative offers will not be permitted
C.2.13.6	A two-envelope procedure will be followed as described in clause C.2.13.7.
C.2.13.7	Tenderers shall note the specific requirements for packaging of their tender documents and include only the following:

Clause number	Tender Data
	• Financial: one (1) original document marked "Original" **including** Form of Offer and Acceptance, Estimated monthly expenditure and Priced Bills of Quantities; and • Technical: one (1) document pack **without any** pricing (files in PDF format) on a **memory stick** Financial or pricing details should **ONLY** be included in the printed document pack marked '**ORIGINAL**', and not in the PDF file(s) of the document(s) on the **memory stick**. **NB**: Service Providers are to submit one (1) pack of the original tender with the memory stick (USB) in the same envelope, failure to comply will lead to your bid being **disqualified**. **INCLUSION OF ANY PRICING INFORMATION ANYWHERE IN THE COPY WILL LEAD TO THE BID BEING DISQUALIFIED.** The original document will be placed in one envelope and the one copy will be placed in another envelope. The two envelopes shall be placed together in an outer envelope sealed and bearing the following: • The address as stated in C.2.15.1 below • The identification details as stated in C.2.15.1 below • Name of the Tenderer • The words "Not be opened before the Tender opening" The technical and financial envelopes should also contain the details of the last three bullets on them. The financial envelope must contain the words NOT TO BE OPENED WITH THE TECHNICAL ENVELOPE.
C.2.13.9	Telephonic, telegraphic, telex, facsimile or e-mailed tender offers will not be accepted.
C.2.15.1	The Employer's address for delivery of tender offers and identification details to be shown on each tender offer package are: Location of Tender box: SANBI - Biodiversity Centre Identification details: Tender number: G506/2023 Title of Tender: APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS
C.2.15.2	The closing time for submission of tender offers is as stated in the Tender Notice and Invitation to Tender.
C.2.16.1	The tender offer validity period is **90** days.
C2.16.3	Where a tenderer, at any time after the opening of his tender offer but prior to entering into a contract based on his tender offer: (1) withdraws his tender; (2) gives notice of his inability to execute the contract in terms of his tender; or (3) fails to comply with a request made in terms of C.2.17 or C.2.18 such tenderer shall be barred from tendering on any of the Employer's future tenders for a period to be determined by the Employer, but not less than six (6) months, from the date of tender closure. The Employer may fully or partly exempt a tenderer from the provisions of this condition if he is of the opinion that the circumstances justify the exemption
C.2.17	Provide clarification of a tender offer to a request to do so from the employer during the evaluation of tender offers.
C.2.18	Any additional information requested under this clause must be provided within 5 working days of the date of request. The tenderer shall, when requested by the Employer to do so, submit the names of all management and supervisory staff that will be employed to supervise the Labour-Intensive portion of the works together with satisfactory evidence that such staff members satisfy the eligibility requirements

Clause number	Tender Data
C.2.22	Tender Documents will **not be returned** to tenderers
C.2.23	The tenderer is required to submit with his/her tender, the following **(failure to provide below documentation will result in the tender being rejected)**: **1)** A copy of the Central Suppliers Database (CSD) registration report. **2)** A printed copy of the Active Contractor's Listing off the CIDB website (www.cidb.org.za) **3)** Letter of Good Standing from the office of the Compensation Commissioner as required by the Compensation for Occupational Injuries and Diseases Act (COIDA). The letter should be issued by the Department of Labour. **4)** In the case of a Joint Venture/Consortium the tax Compliance status Pin or Compliant tax status on CSD report must be submitted for each member of the Joint Venture/Consortium." **5)** Provide a valid proof of registration as an Installation Electrician (IE) from the Department of Labour. **6)** A complusory site briefing certificate
C.3.1.1	The Employer shall respond to clarifications received up to 7 working days before the tender closing time.
C.3.2	The Employer shall issue addenda until 5 working days before the tender closing time.
C.3.5.1	The two-envelope system will be followed for this Tender.
C.3.7	In the event of disqualification, the Employer may, at his sole discretion, impose a specified period during which tender offers will not be accepted from the offending tenderer and report same to the CIDB and National Treasury.
C.3.11.1	The procedure for the evaluation of responsive tenders is stated in **Annexure A**.
C.3.13	Tender offers will only be accepted if: a) the tenderer submits a copy of the CSD registration report or registration number (refer to T2.1.12); b) the tenderer is registered with the Construction Industry Development Board in an appropriate contractor grading designation (refer to T2.1.11); c) 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; d) 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 (refer to T2.1.14); e) the tenderer is registered and in good standing with the compensation fund issued by the Department of Labour (Letter of good standing with COIDA); f) the employer is reasonably satisfied that the tenderer has in terms of the Construction Regulations, 2014, issued in terms of the Occupational Health and Safety Act, 1993, the necessary competencies and resources to carry out the work safely. g) A copy of Tax Compliance Status Pin or CSD report. h) valid proof of registration as an Installation Electrician (IE) (Wireman's License) from the Department of Labour is submitted. i) A compulsory site briefing certificate

Annexure A

This annexure contains all the criteria that the Employer shall use to evaluate tenders. In accordance with clause C.3.11 of the Standard Conditions of Tender. No other factors, methods or criteria shall be used. The tenderer shall provide all the information requested in the forms included in Part T2.2 – Returnable schedules.

Tenders shall be evaluated in three stages as follows

- Stage 1 – Evaluation of Eligibility and Administrative compliance
- Stage 2 – Evaluation of Functionality
- Stage 3 – Evaluation of Tender Price and Preference

1 Stage 1: Eligibility and Administrative compliance

The first stage will determine whether bids are compliant with all mandatory and disqualifiable submission requirements. Bidders that are deemed compliant will be eligible for further evaluation.

The criteria as identified in Clauses C.2.23 and C.3.13 in the Tender Data will be used to determine the tenders' eligibility.

For administrative compliance, the tenderers must complete all the returnable forms in Part T2.2, the Bill of Quantities and the Offer section in Part C1.1.

2 Stage 2: Functionality

The tenderers who complied with the eligibility and administrative criteria in stage 1 are considered for further evaluation on their capability to execute the project.

In this stage tenderers, will be evaluated on functionality according to the criteria listed below. Tenderers who fail to score a minimum of 70 points out of a possible 100 points on functionality criteria will not be eligible for further consideration.

Scoring quality

The functionality (quality) evaluation criteria are listed below. Maximum points for each criterion are in bold while points for each sub-criterion are indicated in brackets.

<table>
<tr><th colspan="3">FUNCTIONALITY CRITERIA</th></tr>
<tr><th>ID</th><th>CRITERIA</th><th>POINTS</th></tr>
<tr><td>1</td><td>Implementation method and project plan or programme

(a) Project methodology (15 points)

• Method to be followed in delivering this project, the methodology and approach must be specific to the project and location of works.
• A team organogram of the people who will be working on the project tendered should be included.
• Time and quality management of the project should be provided.
• A list of subcontractors (if any) to be utilised for various disciplines and how the work will be dispatched to subcontractors considering the reasonable response times.

<table><tr><th>Sub-Criteria</th><th>Points</th></tr></table></td><td>25</td></tr>
</table>

	No Methodology	0
	Poor Methodology	3
	Average Methodology	6
	Above Average Methodology	9
	Good Methodology	12
	Comprehensive (Exceptional) Methodology	15

(b) Weekly plan/programme with milestones (10 Points)

- The programme should indicate the sequence of work execution.
- Milestones and resources linked to the activities should be included.
- The programme should be practical, realistic and include all activities linked to the project.

Sub-Criteria	**Points**
No Programme	0
Poor Programme	2
Average Programme	4
Above Average Programme	6
Good Programme	8
Comprehensive (Exceptional) Programme	10

2	**Contractor's Experience** • Five valid, verifiable and positive reference letters (on the client's letterhead, dated, signed and stamped) regarding work of similar scope and value completed in the last ten (10) years (25 points)	**40**

Sub-Criteria	**Points**
No valid and positive reference letter	0
One valid and positive reference letter	5
Two valid and positive reference letters	10
Three valid and positive reference letters	15
Four valid and positive reference letters	20
Five valid and positive reference letters or more	25

- List of at least five similar valid and verifiable projects with appointment letters, completion certificates and telephonic references indicating work of similar scope and value completed in the last ten years (15 points).

Sub-Criteria	**Points**
No project	0
One Project	3
Two Projects	6
Three Projects	9

	Four Projects	12
	Five or more Projects	15

Notes:

- Supporting documents required to support the claims above, (Corresponding orders/appointment letters, completion certificates and reference letters for projects must be submitted as proof). Bidders must submit all the requested documents as proof to be awarded the points.
- The submitted projects (appointment, completion and reference letters) must be valid and verifiable.
- SANBI reserves the right to verify the information provided and the bidder shall be notified of such and supporting documents might be requested and should be submitted within the stipulated timeframes.
- SANBI may also conduct site visits to verify the submitted. The bidder must make adequate means to enable the verification process.

Failure by the bidder to provide the requested supporting documents and site visit, the bidder shall be disqualified for further evaluation.

- Both appointment letters and reference letters must be on the employer's letterhead, dated and signed by the employer.
- Failure to complete and sign schedule of the tenderer`s experience will result in the bidder forfeiting these points.

3

Contractor's Resources – Personnel and Plant — **35**

Proposed personnel (30 points):

- CV for proposed key personnel to be full-time on site **(at least 3— Contracts Manager, Site Agent & OHS Officer/Agent/Manager)** indicating:
  - Previous work experience of similar projects
  - Total number of years' working experience in construction
  - Individual experience on similar work in last five years
  - Certified copies of Qualifications, Professional Registration or personnel's certification or other recognised training courses completed.
  - Valid Professional Registration for Contracts Manager (ECSA or SACPCMP) and OHS personnel (SACPCMP)

Sub-Criteria	Points
Combined CV experience of less than 5 years	6
Combined CV experience of more than 5 years	12
Combined CV experience of more than 10 years	18
Combined CV experience of more than 15 years	24
Combined CV experience of more than 20 years	30

Note: Each CV with 10 years or more experience will receive a maximum of 10 points.

Plant (5 points):

- Equipment owned by Contractor (registration documents required)
- Equipment to be rented (if any) with preferred rental companies indicated (letter of intent to hire (registration documents attached)).

TOTAL	**100**

Functionality shall be scored by not less than three evaluators in accordance with the following schedules:

Each evaluation criterion will be assessed in terms of five indicators – no response, poor, satisfactory, acceptable, good and very good. Scores ranging from of 0 to 5 will be allocated to no response, very poor, poor, acceptable, good and very good responses, respectively. The scores submitted by each of the evaluators will be averaged, weighted and then totalled to obtain the final score for functionality. The prompts for judgment and the associated scores used in the evaluation of quality shall be as follows:

Score	Prompt for judgement
0	Failed to address the question / issue
1	Very poor response: - response / answer / solution lacks convincing evidence of skill / experience sought or medium risk that relevant skills will not be available.
2	Poor response – some elements of the response / answer / solution are present, but documentary evidence is mostly lacking in respect of the required information
3	Acceptable response / answer / solution to the particular aspect of the requirements and evidence given of skill / experience sought
4	Above acceptable - response / answer / solution demonstrating real understanding of requirements and evidence of ability to meet it.
5	Excellent - response / answer / solution provides confidence that the tenderer will add real value to the project.

The minimum number of evaluation points for functionality proposal is 70 points in order to progress to stage 3 of the evaluation.

The stage three will evaluate the price and specific goals of those bids that meet the minimum threshold for functionality. In accordance with the Preferential Procurement Regulations, 2022 pertaining to the Preferential Procurement Policy Framework Act (No. 5 of 2000), the 80/20-point system will be applied in evaluating proposals that qualify for further consideration, where price constitutes 80 points and a maximum of 20 points will be awarded based on the bidder's specific goals.

3 Stage 3: Tender Price and Preference

The tenderers who complied with the functionality criteria in stage 2 are considered for further evaluation in terms of their Tender Price and Preference points.

3.1 Correction of arithmetical errors

Pursuant to clause C.3.9 of the standard conditions of tender as amended in the Tender Data, correction of arithmetical errors shall be undertaken.

3.2 Calculation of score for Tender Price

The score for Tender Price shall be calculated using the following formula:

$$N_F = W_f \times \left[1 - \left(\frac{P_t - P_{min}}{P_{min}}\right)\right]$$

Where:

N_F = the score for Tender Price awarded for the tender under consideration

W_f = the weighting given to financial offer, determined as follows:

- 90 where the Tender Price, inclusive of VAT, of all responsive tender offers received has a value in excess of R50 000 000,00; or
- 80 where the Tender Price, inclusive of VAT, of one or more responsive tender offers has a value that equals or is less than R50 000 000,00.

P_t = Tender Price of the tender under consideration

P_{min} = Tender Price of the lowest responsive tender

In the event that the calculated value of N_F is negative, the allocated score shall be 0

3.3 Financial and Preference

After calculation of the scores for Tender Price and for Preference, a combined score will be calculated as follows:

NT = NF + NP

Where:

NT = Total score for tender under consideration

NF = Score for Tender Price

NP = Score for Preference

The tender with the highest score should be recommended for appointment.

Annexure C

Standard Conditions of Tender

C.1 General

C.1.1 Actions

C.1.1.1 The employer and each tenderer submitting a tender offer shall comply with these conditions of tender. In their dealings with each other, they shall discharge their duties and obligations as set out in C.2 and C.3, timeously and with integrity, and behave equitably, honestly and transparently, comply with all legal obligations and not engage in anticompetitive practices.

C.1.1.2 The employer and the tenderer and all their agents and employees involved in the tender process shall avoid conflicts of interest and where a conflict of interest is perceived or known, declare any such conflict of interest, indicating the nature of such conflict. Tenderers shall declare any potential conflict of interest in their tender submissions. Employees, agents and advisors of the employer shall declare any conflict of interest to whoever is responsible for overseeing the procurement process at the start of any deliberations relating to the procurement process or as soon as they become aware of such conflict and abstain from any decisions where such conflict exists or recuse themselves from the procurement process, as appropriate.

Note: *1) A conflict of interest may arise due to a conflict of roles which might provide an incentive for improper acts in some circumstances. A conflict of interest can create an appearance of impropriety that can undermine confidence in the ability of that person to act properly in his or her position even if no improper acts result.*

2) Conflicts of interest in respect of those engaged in the procurement process include direct, indirect or family interests in the tender or outcome of the procurement process and any personal bias, inclination, obligation, allegiance or loyalty which would in any way affect any decisions taken.

C.1.1.3 The employer shall not seek, and a tenderer shall not submit a tender without having a firm intention and the capacity to proceed with the contract.

C.1.2 Tender Documents

The documents issued by the employer for the purpose of a tender offer are listed in the tender data.

C.1.3 Interpretation

C.1.3.1 The tender data and additional requirements contained in the tender schedules that are included in the returnable documents are deemed to be part of these conditions of tender.

C.1.3.2 These conditions of tender, the tender data and tender schedules which are required for tender evaluation purposes, shall form part of any contract arising from the invitation to tender.

C.1.3.3 For the purposes of these conditions of tender, the following definitions apply:

a) **conflict of interest** means any situation in which:

i) someone in a position of trust has competing professional or personal interests which make it difficult to fulfill his or her duties impartially;

ii) an individual or tenderer is in a position to exploit a professional or official capacity in some way for their personal or corporate benefit; or

iii) incompatibility or contradictory interests exist between an employee and the tenderer who employs that employee.

b) **comparative offer** means the price after the factors of a non-firm price and all unconditional discounts it can be utilised to have been taken into consideration;

c) **corrupt practice** means the offering, giving, receiving or soliciting of anything of value to influence the action of the employer or his staff or agents in the tender process;

d) **fraudulent practice** means the misrepresentation of the facts in order to influence the tender process or the award of a contract arising from a tender offer to the detriment of the employer, including collusive practices intended to establish prices at artificial levels;

C.1.4 Communication and employer's agent

Each communication between the employer and a tenderer shall be to or from the employer's agent only, and in a form that can be readily read, copied and recorded. Communications shall be in the English language. The employer shall not take any responsibility for non-receipt of communications from or by a tenderer. The name and contact details of the employer's agent are stated in the tender data.

C.1.5 Cancellation and Re-Invitation of Tenders

C.1.5.1 An employer may, prior to the award of the tender, cancel a tender if-

a) due to changed circumstances, there is no longer a need for the engineering and construction works specified in the invitation;

b) funds are no longer available to cover the total envisaged expenditure; or

c) no acceptable tenders are received.

d) there is a material irregularity in the tender process.

C.1.5.2 The decision to cancel a tender invitation must be published in the same manner in which the original tender invitation was advertised

C.1.5.3 An employer may only with the prior approval of the relevant treasury cancel a tender invitation for the second time.

C.1.6 Procurement procedures

C.1.6.1 General

Unless otherwise stated in the tender data, a contract will, subject to C.3.13, be concluded with the tenderer who in terms of C.3.11 is the highest ranked or the tenderer scoring the highest number of tender evaluation points, as relevant, based on the tender submissions that are received at the closing time for tenders.

C.1.6.2 Competitive negotiation procedure

C.1.6.2.1 Where the tender data require that the competitive negotiation procedure is to be followed, tenderers shall submit tender offers in response to the proposed contract in the first round of submissions. Notwithstanding the requirements of C.3.4, the employer shall announce only the names of the tenderers who make a submission. The requirements of C.3.8 relating to the material deviations or qualifications which affect the competitive position of tenderers shall not apply.

C.1.6.2.2 All responsive tenderers or at least a minimum of not less than three responsive tenderers that are highest ranked in terms of the evaluation criteria stated in the tender data shall be invited to enter into competitive negotiations based on the principle of equal treatment, keeping confidential the proposed solutions and associated information.

Notwithstanding the provisions of C.2.17, the employer may request that tenders be clarified, specified and fine-tuned in order to improve a tenderer's competitive position provided that such clarification, specification, fine-tuning or additional information does not alter any fundamental aspects of the offers or impose substantial new requirements which restrict or distort competition or have a discriminatory effect.

C.1.6.2.3 At the conclusion of each round of negotiations, tenderers shall be invited by the employer to revise their tender offer based on the same evaluation criteria, with or without adjusted weightings. Tenderers shall be advised when they are to submit their best and final offer.

C.1.6.2.4 The contract shall be awarded in accordance with the provisions of C.3.11 and C.3.13 after tenderers have been requested to submit their best and final offer.

C.1.6.3 Proposal procedure using the two stage-system

C.1.6.3.1 Option 1

Tenderers shall in the first stage submit technical proposals and, if required, cost parameters around which a contract may be negotiated. The employer shall evaluate each responsive submission in

terms of the method of evaluation stated in the tender data, and in the second stage negotiate a contract with the tenderer scoring the highest number of evaluation points and award the contract in terms of these conditions of tender.

C.1.6.3.2 Option 2

C.1.6.3.2.1 Tenderers shall submit in the first stage only technical proposals. The employer shall invite all responsive tenderers to submit tender offers in the second stage, following the issuing of procurement documents.

C.1.6.3.2.2 The employer shall evaluate tenders received during the second stage in terms of the method of evaluation stated in the tender data and award the contract in terms of these conditions of tender.

C.2 Tenderer's obligations

C.2.1 Eligibility

C.2.1.1 Submit a tender offer only if the tenderer satisfies the criteria stated in the tender data and the tenderer, or any of his principals, is not under any restriction to do business with employer.

C.2.1.2 Notify the employer of any proposed material change in the capabilities or formation of the tendering entity (or both) or any other criteria which formed part of the qualifying requirements used by the employer as the basis in a prior process to invite the tenderer to submit a tender offer and obtain the employer's written approval to do so prior to the closing time for tenders.

C.2.2 Cost of tendering

C.2.2.1 Accept that, unless otherwise stated in the tender data, the employer will not compensate the tenderer for any costs incurred in the preparation and submission of a tender offer, including the costs of any testing necessary to demonstrate that aspects of the offer complies with requirements.

C.2.2.2 The cost of the tender documents charged by the employer shall be limited to the actual cost incurred by the employer for printing the documents. Employers must attempt to make available the tender documents on its website so as not to incur any costs pertaining to the printing of the tender documents.

C.2.3 Check documents

Check the tender documents on receipt for completeness and notify the employer of any discrepancy or omission.

C.2.4 Confidentiality and copyright of documents

Treat as confidential all matters arising in connection with the tender. Use and copy the documents issued by the employer only for the purpose of preparing and submitting a tender offer in response to the invitation.

C.2.5 Reference documents

Obtain, as necessary for submitting a tender offer, copies of the latest versions of standards, specifications, conditions of contract and other publications, which are not attached but which are incorporated into the tender documents by reference.

C.2.6 Acknowledge addenda

Acknowledge receipt of addenda to the tender documents, which the employer may issue, and if necessary, apply for an extension to the closing time stated in the tender data, in order to take the addenda into account.

C.2.7 Clarification meeting

Attend, where required, a clarification meeting at which tenderers may familiarize themselves with aspects of the proposed work, services or supply and raise questions. Details of the meeting(s) are stated in the tender data.

C.2.8 Seek clarification

Request clarification of the tender documents, if necessary, by notifying the employer at least five (5) working days before the closing time stated in the tender data.

C.2.9 Insurance

Be aware that the extent of insurance to be provided by the employer (if any) might not be for the full cover required in terms of the conditions of contract identified in the contract data. The tenderer is advised to seek qualified advice regarding insurance.

C.2.10 Pricing the tender offer

C.2.10.1 Include in the rates, prices, and the tendered total of the prices (if any) all duties, taxes except Value Added Tax (VAT), and other levies payable by the successful tenderer, such duties, taxes and levies being those applicable fourteen (14) days before the closing time stated in the tender data.

C.2.10.2 Show VAT payable by the employer separately as an addition to the tendered total of the prices.

C.2.10.3 Provide rates and prices that are fixed for the duration of the contract and not subject to adjustment except as provided for in the conditions of contract identified in the contract data.

C.2.10.4 State the rates and prices in Rand unless instructed otherwise in the tender data. The conditions of contract identified in the contract data may provide for part payment in other currencies.

C.2.11 Alterations to documents

Do not make any alterations or additions to the tender documents, except to comply with instructions issued by the employer, or necessary to correct errors made by the tenderer. All signatories to the tender offer shall initial all such alterations.

C.2.12 Alternative tender offers

C.2.12.1 Unless otherwise stated in the tender data, submit alternative tender offers only if a main tender offer, strictly in accordance with all the requirements of the tender documents, is also submitted as well as a schedule that compares the requirements of the tender documents with the alternative requirements that are proposed.

C.2.12.2 Accept that an alternative tender offer must be based only on the criteria stated in the tender data or criteria otherwise acceptable to the employer.

C.2.12.3 An alternative tender offer must only be considered if the main tender offer is the winning tender.

C.2.13 Submitting a tender offer

C.2.13.1 Submit one tender offer only, either as a single tendering entity or as a member in a joint venture to provide the whole of the works identified in the contract data and described in the scope of works, unless stated otherwise in the tender data.

C.2.13.2 Return all returnable documents to the employer after completing them in their entirety, either electronically (if they were issued in electronic format) or by writing legibly in non-erasable ink.

C.2.13.3 Submit the parts of the tender offer communicated on paper as an original plus the number of copies stated in the tender data, with an English translation of any documentation in a language other than English, and the parts communicated electronically in the same format as they were issued by the employer.

C.2.13.4 Sign the original and all copies of the tender offer where required in terms of the tender data. The employer will hold all authorized signatories liable on behalf of the tenderer. Signatories for tenderers proposing to contract as joint ventures shall state which of the signatories is the lead partner whom the employer shall hold liable for the purpose of the tender offer.

C.2.13.5 Seal the original and each copy of the tender offer as separate packages marking the packages as "ORIGINAL" and "COPY". Each package shall state on the outside the employer's address and identification details stated in the tender data, as well as the tenderer's name and contact address.

C.2.13.6 Where a two-envelope system is required in terms of the tender data, place and seal the returnable documents listed in the tender data in an envelope marked “financial proposal” and place the remaining returnable documents in an envelope marked “technical proposal”. Each envelope shall state on the outside the employer’s address and identification details stated in the tender data, as well as the tenderer's name and contact address.

C.2.13.7 Seal the original tender offer and copy packages together in an outer package that states on the outside only the employer's address and identification details as stated in the tender data.

C.2.13.8 Accept that the employer will not assume any responsibility for the misplacement or premature opening of the tender offer if the outer package is not sealed and marked as stated.

C.2.13.9 Accept that tender offers submitted by facsimile or e-mail will be rejected by the employer, unless stated otherwise in the tender data.

C.2.14 Information and data to be completed in all respects

Accept that tender offers, which do not provide all the data or information requested completely and, in the form required, may be regarded by the employer as non-responsive.

C.2.15 Closing time

C.2.15.1 Ensure that the employer receives the tender offer at the address specified in the tender data not later than the closing time stated in the tender data. Accept that proof of posting shall not be accepted as proof of delivery.

C.2.15.2 Accept that, if the employer extends the closing time stated in the tender data for any reason, the requirements of these conditions of tender apply equally to the extended deadline.

C.2.16 Tender offer validity

C.2.16.1 Hold the tender offer(s) valid for acceptance by the employer at any time during the validity period stated in the tender data after the closing time stated in the tender data.

C.2.16.2 If requested by the employer, consider extending the validity period stated in the tender data for an agreed additional period with or without any conditions attached to such extension.

C.2.16.3 Accept that a tender submission that has been submitted to the employer may only be withdrawn or substituted by giving the employer’s agent written notice before the closing time for tenders that a tender is to be withdrawn or substituted. If the validity period stated in C.2.16 lapses before the employer evaluating tender, the contractor reserves the right to review the price based on Consumer Price Index (CPI).

C.2.16.4 Where a tender submission is to be substituted, a tenderer must submit a substitute tender in accordance with the requirements of C.2.13 with the packages clearly marked as “SUBSTITUTE”.

C.2.17 Clarification of tender offer after submission

Provide clarification of a tender offer in response to a request to do so from the employer during the evaluation of tender offers. This may include providing a breakdown of rates or prices and correction of arithmetical errors by the adjustment of certain rates or item prices (or both). No change in the competitive position of tenderers or substance of the tender offer is sought, offered, or permitted.

Note: *Sub-clause C.2.17 does not preclude the negotiation of the final terms of the contract with a preferred tenderer following a competitive selection process, should the Employer elect to do so.*

C.2.18 Provide other material

C.2.18.1 Provide, on request by the employer, any other material that has a bearing on the tender offer, the tenderer's commercial position (including notarized joint venture agreements), preferencing arrangements, or samples of materials, considered necessary by the employer for the purpose of a full and fair risk assessment.

Should the tenderer not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in the employer's request, the employer may regard the tender offer as non-responsive.

C.2.18.2 Dispose of samples of materials provided for evaluation by the employer, where required.

C.2.19 Inspections, tests and analysis

Provide access during working hours to premises for inspections, tests and analysis as provided for in the tender data.

C.2.20 Submit securities, bonds and policies

If requested, submit for the employer's acceptance before formation of the contract, all securities, bonds, guarantees, policies and certificates of insurance required in terms of the conditions of contract identified in the contract data.

C.2.21 Check final draft

Check the final draft of the contract provided by the employer within the time available for the employer to issue the contract.

C.2.22 Return of other tender documents

If so instructed by the employer, return all retained tender documents within twenty-eight (28) days after the expiry of the validity period stated in the tender data.

C.2.23 Certificates

Include in the tender submission or provide the employer with any certificates as stated in the tender data.

C.3 The employer's undertakings

C.3.1 Respond to requests from the tenderer

C.3.1.1 Unless otherwise stated in the tender Data, respond to a request for clarification received up to five (5) working days before the tender closing time stated in the Tender Data and notify all tenderers who collected tender documents.

C.3.1.2 Consider any request to make a material change in the capabilities or formation of the tendering entity (or both) or any other criteria which formed part of the qualifying requirements used to prequalify a tenderer to submit a tender offer in terms of a previous procurement process and deny any such request if as a consequence:

a) an individual firm, or a joint venture as a whole, or any individual member of the joint venture fails to meet any of the collective or individual qualifying requirements;

b) the new partners to a joint venture were not prequalified in the first instance, either as individual firms or as another joint venture; or

c) in the opinion of the Employer, acceptance of the material change would compromise the outcome of the prequalification process.

C.3.2 Issue Addenda

If necessary, issue addenda that may amend or amplify the tender documents to each tenderer during the period from the date that tender documents are available until three (3) working days before the tender closing time stated in the 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.3.3 Return late tender offers

Return tender offers received after the closing time stated in the Tender Data, unopened, (unless it is necessary to open a tender submission to obtain a forwarding address), to the tenderer concerned.

C.3.4 Opening of tender submissions

C.3.4.1 Unless the two-envelope system is to be followed, open valid tender submissions in the presence of tenderers' agents who choose to attend at the time and place stated in the tender data. Tender submissions for which acceptable reasons for withdrawal have been submitted will not be opened.

C.3.4.2 Announce at the meeting held immediately after the opening of tender submissions, at a venue indicated in the tender data, the name of each tenderer whose tender offer is opened and, where applicable, the total of his prices, number of points claimed for its specific goals and time for completion for the main tender offer only.

C.3.4.3 Make available the record outlined in C.3.4.2 to all interested persons upon request.

C.3.5 Two-envelope system

C.3.5.1 Where stated in the tender data that a two-envelope system is to be followed, open only the technical proposal of valid tenders in the presence of tenderers' agents who choose to attend at the time and place stated in the tender data and announce the name of each tenderer whose technical proposal is opened.

C.3.5.2 Evaluate functionality of the technical proposals offered by tenderers, then advise tenderers who remain in contention for the award of the contract of the time and place when the financial proposals will be opened. Open only the financial proposals of tenderers, who score in the functionality evaluation more than the minimum number of points for functionality stated in the tender data, and announce the score obtained for the technical proposals and the total price and any points claimed on specific goals status level.

C.3.6 Non-disclosure

Not disclose to tenderers, or to any other person not officially concerned with such processes, information relating to the evaluation and comparison of tender offers, the final evaluation price and recommendations for the award of a contract, until after the award of the contract to the successful tenderer.

C.3.7 Grounds for rejection and disqualification

Determine whether there has been any effort by a tenderer to influence the processing of tender offers and instantly disqualify a tenderer (and his tender offer) if it is established that he engaged in corrupt or fraudulent practices.

C.3.8 Test for responsiveness

C.3.8.1 Determine, after opening and before detailed evaluation, whether each tender offer properly received:

a) complies with the requirements of these Conditions of Tender,

b) has been properly and fully completed and signed, and

c) is responsive to the other requirements of the tender documents.

C.3.8.2 A responsive tender is one that conforms to all the terms, conditions, and specifications of the tender documents without material deviation or qualification. A material deviation or qualification is one which, in the Employer*'s* opinion, would:

a) detrimentally affect the scope, quality, or performance of the works, services or supply identified in the Scope of Work*,*

b) significantly change the Employer*'s* or the tenderer's risks and responsibilities under the contract, or

c) affect the competitive position of other tenderers presenting responsive tenders, if it were to be rectified.

Reject a non-responsive tender offer, and not allow it to be subsequently made responsive by correction or withdrawal of the non-conforming deviation or reservation.

C.3.9 Arithmetical errors, omissions and discrepancies

C.3.9.1 Check responsive tenders for discrepancies between amounts in words and amounts in figures. Where there is a discrepancy between the amounts in figures and the amount in words, the amount in words shall govern.

C.3.9.2 Check the highest ranked tender or tenderer with the highest number of tender evaluation points after the evaluation of tender offers in accordance with C.3.11 for:

a) the gross misplacement of the decimal point in any unit rate;

b) omissions made in completing the pricing schedule or bills of quantities; or

c) arithmetic errors in:

(i) line item totals resulting from the product of a unit rate and a quantity in bills of quantities or schedules of prices; or

(ii) the summation of the prices.

C.3.9.3 Notify the tenderer of all errors or omissions that are identified in the tender offer and either confirm the tender offer as tendered or accept the corrected total of prices.

C.3.9.4 Where the tenderer elects to confirm the tender offer as tendered, correct the errors as follows:

a) If bills of quantities or pricing schedules apply and there is an error in the line item total resulting from the product of the unit rate and the quantity, the line item total shall govern and the rate shall be corrected. Where there is an obviously gross misplacement of the decimal point in the unit rate, the line item total as quoted shall govern, and the unit rate shall be corrected.

b) Where there is an error in the total of the prices either as a result of other corrections required by this checking process or in the tenderer's addition of prices, the total of the prices shall govern, and the tenderer will be asked to revise selected item prices (and their rates if bills of quantities apply) to achieve the tendered total of the prices.

C.3.10 Clarification of a tender offer

Obtain clarification from a tenderer on any matter that could give rise to ambiguity in a contract arising from the tender offer.

C.3.11 Evaluation of tender offers

The Standard Conditions of Tender standardize the procurement processes, methods and procedures from the time that tenders are invited to the time that a contract is awarded. They are generic in nature and are made project specific through choices that are made in developing the Tender Data associated with a specific project.

Conditions of tender are by definition the document that establishes a tenderer’s obligations in submitting a tender and the employer’s undertakings in soliciting and evaluating tender offers. Such conditions establish the rules from the time a tender is advertised to the time that a contract is awarded and require employers to conduct the process of offer and acceptance in terms of a set of standard procedures.

The CIDB Standard Conditions of Tender are based on a procurement system that satisfies the following system requirements:	
Requirement	**Qualitative interpretation of goal**
Fair	The process of offer and acceptance is conducted impartially without bias, providing simultaneous and timely access to participating parties to the same information.
Equitable	Terms and conditions for performing the work do not unfairly prejudice the interests of the parties.
Transparent	The only grounds for not awarding a contract to a tenderer who satisfies all requirements are restrictions from doing business with the employer, lack of capability or capacity, legal impediments and conflicts of interest.

Competitive	The system provides for appropriate levels of competition to ensure cost effective and best value outcomes.
Cost effective	Cost effective

The activities associated with evaluating tender offers are as follows:

a) Open and record tender offers received

b) Determine whether or not tender offers are complete

c) Determine whether or not tender offers are responsive

d) Evaluate tender offers

e) Determine if there are any grounds for disqualification

f) Determine acceptability of preferred tenderer

g) Prepare a tender evaluation report

h) Confirm the recommendation contained in the tender evaluation report

C.3.11.1 General

The employer must appoint an evaluation panel of not less than three persons conversant with the proposed scope of works to evaluate each responsive tender offer using the tender evaluation methods and associated evaluation criteria and weightings that are specified in the tender data.

C.3.12 Insurance provided by the employer

If requested by the proposed successful tenderer, submit for the tenderer*'s* information the policies and / or certificates of insurance which the conditions of contract identified in the contract data, require the employer to provide.

C.3.13 Acceptance of tender offer

Accept the tender offer; if in the opinion of the employer, it does not present any risk and only if the tenderer:

a) is not under restrictions, or has principals who are under restrictions, preventing participating in the employer's procurement;

b) can, as necessary and in relation to the proposed contract, demonstrate that he or she possesses the professional and technical qualifications, professional and technical competence, financial resources, equipment and other physical facilities, managerial capability, reliability, experience and reputation, expertise and the personnel, to perform the contract;

c) has the legal capacity to enter into the contract;

d) is not; insolvent, in receivership, under Business Rescue as provided for in chapter 6 of the Companies Act No. 2008, bankrupt or being wound up, has his/her affairs administered by a court or a judicial officer, has suspended his/her business activities or is subject to legal proceedings in respect of any of the foregoing;

e) complies with the legal requirements, if any, stated in the tender data; and

f) is able, in the opinion of the employer, to perform the contract free of conflicts of interest.

C.3.14 Prepare contract documents

C.3.14.1 If necessary, revise documents that shall form part of the contract and that were issued by the employer as part of the tender documents to take account of:

a) addenda issued during the tender period,

b) inclusion of some of the returnable documents and

c) other revisions agreed between the employer and the successful tenderer.

C.3.14.2 Complete the schedule of deviations attached to the form of offer and acceptance, if any.

C.3.15 Complete adjudicator's contract

Unless alternative arrangements have been agreed or otherwise provided for in the contract, arrange for both parties to complete formalities for appointing the selected adjudicator at the same time as the main contract is signed.

C.3.16 Registration of the award

An employer must, within twenty-one (21) working days from the date on which a contractor's offer to perform a construction works contract is accepted in writing by the employer, register and publish the award on the CIDB Register of Projects.

C.3.17 Provide copies of the contracts

Provide to the successful tenderer the number of copies stated in the Tender Data of the signed copy of the contract as soon as possible after completion and signing of the form of offer and acceptance.

C.3.18 Provide written reasons for actions taken

Provide upon request written reasons to tenderers for any action that is taken in applying these conditions of tender but withhold information which is not in the public interest to be divulged, which is considered to prejudice the legitimate commercial interests of tenderers or might prejudice fair competition between tenderers.

PART T 2: Returnable Documents

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

T2.1 List of Returnable Documents

1. RETURNABLE SCHEDULES REQUIRED FOR TENDER EVALUATION PURPOSES

Tender document name	Number of pages issued	Returnable document
Resolution of Board of Directors (T2.1.01)	1 Page	■ Yes □ No
Resolution of Board of Directors to enter into consortia or JV's (T2.1.02) (If Applicable)	2 Pages	■ Yes □ No
Special Resolution of Consortia or JV's (T2.1.03) (If Applicable)	3 Pages	■ Yes □ No
Schedule of proposed sub-contractors (T2.1.04)	1 Page	■ Yes □ No
Capacity of Tenderer (T2.1.05)	3 Pages	■ Yes □ No
Preference Point System (T2.1.06)	6 Pages	■ Yes □ No
Schedule of Key Personnel (T2.1.07)	1 Pages	■ Yes □ No
Compensation of Occupational Injuries and Disease Act (COIDA) (T2.1.08)	1 Page	■ Yes □ No

2. OTHER DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES

Tender document name	Number of pages issued	Returnable document
Declaration of Interest (T2.1.09)	2 Pages	■ Yes □ No
Medical Certificate for the confirmation of permanent disabled status (T2.1.10)	1 Page	■ Yes □ No
Proof of registration with Construction Industry Development Board (T2.1.11)	1 Page	■ Yes □ No
Copy of CSD Registration Certificate (T2.1.12)	1 Pages	■ Yes □ No

3. RETURNABLE SCHEDULES THAT WILL BE INCORPORATED INTO THE CONTRACT

Tender document name	Number of pages issued	Returnable document
Record of Addenda to tender documents (T2.1.13)	1 Page	■ Yes □ No
Compulsory Enterprise Questionnaire (T2.1.14)	3 Pages	■ Yes □ No

4. OTHER DOCUMENTS THAT WILL BE INCORPORATED INTO THE CONTRACT

Tender document name	Number of pages issued	Returnable document
Applicable Form of Guarantee	3 Pages	■ Yes □ No
Priced Bill of Quantities	6 Pages	■ Yes □ No

C1.1 Form of Offer and Acceptance
C1.2 Contract Data
C1.3 Form of Guarantee

RETURNABLE DOCUMENT CHECKLIST

This form has been created as an aid to ensure a tenderer's compliance with the completion of the returnable schedules and subsequent placement in the correct **Technical** and **Financial** envelopes.

A TECHNICAL ENVELOPE (1 COPY)

Reference No	Document Description	Tick if completed
T2.1.01	Resolution of Board of Directors	
T2.1.02	Resolution of Board of Directors to enter into consortia or JV's (If Applicable)	
T2.1.03	Special Resolution of Consortia or JV's (If Applicable)	
T2.1.04	Schedule of proposed sub-contractors	
T2.1.05	Capacity of Tenderer	
T2.1.06	Preference Point System	
T2.1.07	Schedule of Key Personnel	
T2.1.08	Compensation of Occupational Injuries and Disease Act (COIDA)	
T2.1.09	Declaration of Interest	
T2.1.10	Medical Certificate for the confirmation of permanent disabled status	
T2.1.11	Proof of registration with Construction Industry Development Board	
T2.1.12	Copy of CSD Registration Certificate	
T2.1.13	Record of Addenda to tender documents	
T2.1.14	Compulsory Enterprise Questionnaire	

B FINANCIAL ENVELOPE (ORIGINAL DOCUMENT)

The entire original tender document must be submitted in this envelope including the forms as listed below:

Reference No	Document Description	Tick if completed
Form C1.1	Form of Offer and Acceptance	
Form C1.2	Contract Data – Part 1	
Form C2.2	Priced Bill of Quantities	

PART 2: RETURNABLE DOCUMENTS

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

T2.2 Returnable documents/Schedules

T2.1.01: RESOLUTION OF BOARD OF DIRECTORS

RESOLUTION of a meeting of the Board of *Directors / Members / Partners of:

.....

.....
(*legally correct full name and registration number, if applicable, of the Enterprise)*

Held at ..... (place)

On ..... (date)

RESOLVED that:

1. The Enterprise submits a Bid / Tender to the South African National Biodiversity Institute in respect of the following project:

   .....

   .....
   (*project description as per Bid / Tender Document)*

   Bid / Tender Number: ..... *(Bid / Tender Number as per Bid / Tender Document)*

2. *Mr/Mrs/Ms: .....

   in *his/her Capacity as: ..... *(Position in the Enterprise)*

   and who will sign as follows: .....

   be, and is hereby, authorised to sign the Bid / Tender, and any and all other documents and/or correspondence in connection with and relating to the Bid / Tender, as well as to sign any Contract, and any and all documentation, resulting from the award of the Bid / Tender to the Enterprise mentioned above.

	Name	Capacity	Signature
1			
2			
3			
4			

Note:

1. ** Delete which is not applicable*
2. ***NB**. This resolution must be signed by all the Directors / Members / Partners of the Bidding Enterprise.*
3. *Should the number of Directors / Members/Partners exceed the space available above, additional names and signatures must be supplied on a separate page.*

ENTERPRISE STAMP

T2.1.02: RESOLUTION OF BOARD OF DIRECTORS TO ENTER INTO CONSORTIA OR JOINT VENTURES

RESOLUTION of a meeting of the Board of *Directors / Members / Partners of:

.....

.....
(*Legally correct full name and registration number, if applicable, of the Enterprise)*

Held at ..... (place)

On ..... (date)

RESOLVED that:

1. The Enterprise submits a Bid /Tender, in consortium/Joint Venture with the following Enterprises:

   .....

   .....
   (List all the legally correct full names and registration numbers, if applicable, of the Enterprises forming the Consortium/Joint Venture)

   to the South African National Biodiversity Institute in respect of the following project:

   .....

   .....
   (*Project description as per Bid /Tender Document)*

   Bid / Tender Number: ..... *(Bid / Tender Number as per Bid / Tender Document)*

2. *Mr/Mrs/Ms: .....

   in *his/her Capacity as: ..... *(Position in the Enterprise)*

   and who will sign as follows: .....

   be, and is hereby, authorised to sign a consortium/joint venture agreement with the parties listed under item 1 above, and any and all Other documents and/or correspondence in connection with and relating to the consortium/joint venture, in respect of the project described under item 1 above.

3. The Joint Venture formation/arrangement will be in the following proportions:

Name of Contractor	Proportion (%)

4. The Enterprise accepts joint and several liability with the parties listed under item 1 above for the due fulfilment of the obligations of the joint venture deriving from, and in any way connected with, the Contract to be entered into with the Employer in respect of the project described under item 1 above.

5. The Enterprise chooses as its *domicilium citandi et executandi* for all purposes arising from this joint venture agreement and the Contract with the Employer in respect of the project under item 1 above:

   Physical address: .....

   .....

   ..... (code)

   Postal address: .....

   .....

   ..... (code)

   Telephone number: ..... (code)

   Fax number: ..... (code)

	Name	Capacity	Signature
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Note:

1. ** Delete which is not applicable.*
2. ***NB**. This resolution must be signed by all the Directors / Members / Partners of the Bidding Enterprise.*
3. *Should the number of Directors / Members / Partners exceed the space available above, additional names and signatures must be supplied on a separate page.`*

ENTERPRISE STAMP

T2.1.03: SPECIAL RESOLUTION OF CONSORTIA OR JOINT VENTURES

RESOLUTION of a meeting of the duly authorised representatives of the following legal entities who have entered into a consortium/joint venture to jointly bid for the project mentioned below: (*legally correct full names and registration numbers, if applicable, of the Enterprises forming a Consortium/Joint Venture)*

1. .....

.....

2. .....

.....

3. .....

.....

4. .....

.....

5. .....

.....

6. .....

.....

7. .....

.....

8. .....

.....

Held at ..... (place)

On ..... (date)

RESOLVED that:

A. The above-mentioned Enterprises submit a Bid in Consortium/Joint Venture to the South African National Biodiversity Institute in respect of the following project:

.....

.....
(*Project description as per Bid /Tender Document)*

Bid / Tender Number: ..... *(Bid / Tender Number as per Bid / Tender Document)*

*Mr/Mrs/Ms: .....

in *his/her Capacity as: ..... *(Position in the Enterprise)*

and who will sign as follows: .....
be, and is hereby, authorised to sign the Bid, and any and all other documents and/or correspondence in connection with and relating to the Bid, as well as to sign any Contract, and any and all documentation, resulting from the award of the Bid to the Enterprises in Consortium/Joint Venture mentioned above.

B. The Enterprises constituting the Consortium/Joint Venture, notwithstanding its composition, shall conduct all business under the name and style of: .....

C. The Enterprises to the Consortium/Joint Venture accept joint and several liabilities for the due fulfilment of the obligations of the Consortium/Joint Venture deriving from, and in any way connected with, the Contract entered into with the Employer in respect of the project described under item A above.

D. Any of the Enterprises to the Consortium/Joint Venture intending to terminate the consortium/joint venture agreement, for whatever reason, shall give the Employer 30 day's written notice of such intention. Notwithstanding such decision to terminate, the Enterprises shall remain jointly and severally liable to the Employer for the due fulfilment of the obligations of the Consortium/Joint Venture as mentioned under item D above.

E. No Enterprise to the Consortium/Joint Venture shall, without the prior written consent of the other Enterprises to the Consortium/Joint Venture and of the Employer, cede any of its rights or assign any of its obligations under the consortium/joint venture agreement in relation to the Contract with the Employer referred to herein.

F. The Enterprises choose as the *domicilium citandi et executandi* of the Consortium/Joint Venture for all purposes arising from the consortium/joint venture agreement and the Contract with the Employer in respect of the project under item A above:

Physical address:.....

.....

..... (code)

Postal address: .....

.....

..... (code)

Telephone number: ..... (code)

Fax number: ..... (code)

	Name	Capacity	Signature
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Note:

1. ** Delete which is not applicable.*
2. ***NB**. This resolution must be signed by all the Duly Authorised Representatives of the Legal Entities to the Consortium Joint Venture submitting this Bid.*
3. *Should the number of Duly Authorised Representatives of the Legal Entities joining forces in this Bid exceed the space available above, additional names and signatures must be supplied on a separate page.*
4. *Resolutions, duly completed and signed, from the separate Enterprises who participate in this Consortium/Joint Venture must be attached to the Special Resolution.*

T2.1.04: SCHEDULE OF PROPOSED SUBCONTRACTORS

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

We notify you that it is our intention to employ the following Subcontractors for work in this contract.

If we are awarded a contract, we agree that this notification does not change the requirement for us to submit the names of proposed Subcontractors in accordance with requirements in the contract for such appointments. If there are no such requirements in the contract, then your written acceptance of this list shall be binding between us.

	Name and address of proposed Subcontractor	**Nature and extent of work**	**Previous experience with Subcontractor**
1			
2			
3			
4			

Name of representative	**Signature**	**Capacity**	**Date**

Name of organisation:	

T2.1.05: CAPACITY OF TENDERER

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

1. WORK CAPACITY: *(The Tenderer is requested to furnish the following particulars, attach additional pages if more space is required. Failure to furnish the particulars may result in the Tender being disregarded.)*

Skilled artisans employed		**Unskilled employees employed**	
Categories of artisans	**Number**	**Categories of employees**	**Number**

1.1. Provide full particulars of:

Machinery	**Plant**	**Workshops**

2. PARTICULARS OF COMMITMENTS WHICH THE TENDERER HAS PREVIOUSLY COMPLETED AND PRESENTLY ENGAGED WITH:

Any reference to words “Bid” or Bidder” herein and/or in any other documentation shall be construed to have the same meaning as the words “Tender” or “Tenderer”.

Page **34** of 113

2.1. Current projects:

	Project	Place (town)	Reference / Contact Person	Contact Tel. No.	Contract amount	Contract period	Date of commencement	Scheduled date of completion
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Any reference to words “Bid” or Bidder” herein and/or in any other documentation shall be construed to have the same meaning as the words “Tender” or “Tenderer”.

2.2. Previous projects:

	Project	Place (town)	Reference / Contact Person	Contact Tel. No.	Contract amount	Contract period	Date of commencement	Scheduled date of completion	Actual date of completion
1									
2									
3									
4									
5									
6									
7									
8									

Name of Tenderer	**Signature**	**Date**

Any reference to words “Bid” or Bidder” herein and/or in any other documentation shall be construed to have the same meaning as the words “Tender” or “Tenderer”.

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T2.1.06: PREFERENCE POINT SYSTEM

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

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

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

---

1. GENERAL CONDITIONS

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

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

1.2 To be completed by the organ of state

a) The applicable preference point system for this tender is the 80/20 preference point system.

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

(a) Price; and

(b) Specific Goals.

1.4 To be completed by the organ of state:

The maximum points for this tender are allocated as follows:

	POINTS
PRICE	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 OR 90/10 PREFERENCE POINT SYSTEMS

A maximum of 80 or 90 points is allocated for price on the following basis:

80/20 **or** **90/10**

$$Ps = 80\left(1 - \frac{Pt - P\,min}{P\,min}\right) \quad \text{or} \quad Ps = 90\left(1 - \frac{Pt - P\,min}{P\,min}\right)$$

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmin = Price of lowest acceptable tender

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

3.2.1. POINTS AWARDED FOR PRICE

A maximum of 80 or 90 points is allocated for price on the following basis:

80/20 **or** **90/10**

$$Ps = 80\left(1 + \frac{Pt - P\,max}{P\,max}\right) \quad \text{or} \quad Ps = 90\left(1 + \frac{Pt - P\,max}{Pmax}\right)$$

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmax = 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 or 90/10 preference point system applies, an organ of state must, in the tender documents, stipulate in the case of—

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

(b) any other invitation for tender, that either the 80/20 or 90/10 preference point system will apply and that the lowest acceptable tender will be used to determine the applicable preference point system,

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

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

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

The specific goals allocated points in terms of this tender	**Number of points allocated (90/10 system) (To be completed by the organ of state)**	**Number of points allocated (80/20 system) (To be completed by the organ of state)**	**Number of points claimed (90/10 system) (To be completed by the tenderer)**	**Number of points claimed (80/20 system) (To be completed by the tenderer)**
Categories of persons historically disadvantaged by unfair discrimination on the basis of race Information will be verified on CSD report. Points will be allocated based on the percentage of ownership per goal - 100% black ownership = 10 points		10		
Categories of persons historically disadvantaged		10		

by unfair discrimination on the basis of gender. Information will be verified on CSD report. Points will be allocated based on the percentage of ownership per goal - 100% female ownership = 10 points				

DECLARATION WITH REGARD TO COMPANY/FIRM

4.3. Name of company/firm…….

4.4. Company registration number: ……...

4.5. TYPE OF COMPANY/ FIRM

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

[TICK APPLICABLE BOX]

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

i) The information furnished is true and correct;

ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;

iii) In the event of a contract being awarded as a result of points claimed as shown in paragraphs 1.4 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct;

iv) If the specific goals have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have –

(a) disqualify the person from the tendering process;

(b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;

(c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;

(d) recommend that the tenderer or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted from obtaining business from any organ of state for a period not

exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and

(e) forward the matter for criminal prosecution, if deemed necessary.

.....
SIGNATURE(S) OF TENDERER(S)

SURNAME AND NAME: .....
DATE: .....

ADDRESS: .....

.....

.....

.....

T2.1.07: SCHEDULE OF KEY PERSONNEL

The Tenderer shall list below the key personnel who will be engaged on the Contract by completing this schedule.

Key Contract Personnel Name	Job Title	Qualifications	Professional Registration	Proposed Project Position

T2.1.08: COMPENSATION OF OCCUPATIONAL INJURIES AND DISEASE ACT (COIDA)

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

The tenderer is registered and in good standing with the compensation fund issued by the Department of Labour (Letter of good standing with COIDA).

T2.1.09: DECLARATION OF INTEREST

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

Any person, including persons in the employ of the South African National Biodiversity Institute; or persons acting on behalf of the South African National Biodiversity Institute performing business as a sole proprietor or in partnership; or persons acting in the capacity of a trustee/s of a trust; or any legal entity, including legal entities and trusts, of which the members, directors, shareholders, trustees and/or beneficiaries are in the employ of the South African National Biodiversity Institute or act on behalf of the South African National Biodiversity Institute, may make an offer or offers in terms of this tender invitation.

In view of the possible allegations of favouritism, should the resulting tender, or part thereof, be awarded to persons employed by the South African National Biodiversity Institute; or to persons who act on behalf of the South African National Biodiversity; or to persons connected or related to them, the bidder / tenderer or the bidder / tenderer's duly authorized representative shall disclose herein any relationship and/or kinship, including blood relation, which he/she; his/her employer; the bidder / tenderer's management; members; directors; partners; shareholders; trustees; and/or beneficiaries may have with any person or persons in the employ of the South African National Biodiversity Institute and/or with any person or persons acting on behalf of the South African National Biodiversity Institute and who may directly or indirectly be involved in, and/or may be in a position to influence the adjudication and/or evaluation and/or award of this bid / tender.

In order to give effect to the above, the following questionnaire shall be completed and submitted with the tender. Failure to furnish the information requested in the questionnaire below may render the tender submission not to be considered at all.

(In answering the questions below, indicate the applicable answer with a ✓ and cross the other out)

1. Is the bidder / tenderer and/or the duly authorized representative in the employ of the South African National Biodiversity Institute?

   ☐ YES ☐ NO

   If yes, State the full particulars of such person/s, together with their current position held as an employee of the South African National Biodiversity Institute.

   _____

   _____

2. Is the bidder / tenderer and/or the duly authorized representative in the employ of the person/s or legal entity acting on behalf of the South African National Biodiversity Institute, and who may directly or indirectly be involved in, and/or may be in a position to influence, the adjudication and/or evaluation and/or award of this tender?

   ☐ YES ☐ NO

   If yes, State the full particulars of such person/s, together with their current position held as an employee of such person/s or legal entity acting on behalf of the South African National Biodiversity Institute.

   _____

3. Does the bidder / tenderer, the bidder's / tenderer's duly authorised representative, and/or any of the bidder's / tenderer's employees, management, partners, members, directors, shareholders, trustees

and/or beneficiaries have any relationship (family, friend, business- or financial interest) with a person, or persons in the employ of the South African National Biodiversity Institute and/or in the employ of the person/s or legal entity acting on behalf of the South African National Biodiversity Institute, and who may directly or indirectly be involved in, and/or may be in a position to influence, the adjudication and/or evaluation and/or award of this tender?

☐ YES ☐ NO

If yes, State the full particulars of the persons between whom the relationship exists, the nature of the relationship and the current position/status of such employee/s of the South African National Biodiversity Institute and/or of the person/s and/or legal entity acting on behalf of the South African National Biodiversity Institute herein.

_____

_____

I, the undersigned, _____
(name of the person duly authorised to sign the bid / tender documents on behalf of the bidder / tenderer) hereby certify that the information, furnished above, is correct in all respects. I accept and understand that the South African National Biodiversity Institute, may act against me and the bidder / tenderer, jointly and severally, should this declaration prove to be false.

Duly signed at _____ on this the _____ day of _____ (month)

_____ (year)

_____	_____
Full name of signatory	Name of Bidder / Tenderer
_____	_____
Capacity of Signatory	Signature

COMMISSIONER OF OATHS

T2.1.10: MEDICAL CERTIFICATE FOR THE CONFIRMATION OF PERMANENT DISABLED STATUS

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

I, _____ (*surname and name*), Identity number,

_____ do hereby declare that I am a registered medical practitioner, with my

practice number being _____, practicing at _____

_____ (Physical and postal addresses) declare that I have examined Mr/Mrs

_____, identity number of _____

and have found the said person to be permanently disabled

or having a recurring disability.

"Disability" means, in respect of a person, a permanent impairment of a physical, intellectual, or sensory function, which results in restricted, or lack of, ability to perform an activity in the manner, or within the range, considered normal for a human being." – As per Preferential Procurement Policy Framework Act: No 5 of 2000 (PPPFA)

The nature of the disability is as follows:

_____

_____

_____

Thus signed at _____ on this _____day of _____ of _____.

_____

Signature

_____

Date

OFFICIAL STAMP OF
MEDICAL PRACTITIONER

T2.1.11: PROOF OF REGISTRATION WITH CONSTRUCTION INDUSTRY DEVELOPMENT BOARD

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

The Tenderer shall provide a printed copy of the Active Contractor's Listing off the CIDB website.www.cidb.org.za. In the case of a joint venture, a printed copy of the Active Contractor's listing must be provided for each member of the joint venture.

Name of Contractor:

Contractor Grading Designation:

CIDB Contractor Registration Number:

T2.1.12: COPY OF CSD REGISTRATION CERTIFICATE

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

A copy of Central Suppliers Database (CSD) Registration Certificate must be included for evaluation purposes.

T2.1.13: RECORD OF ADDENDA TO TENDER DOCUMENTS

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

I / We confirm that the following communications received from the South African National Biodiversity Institute before the submission of this tender offer, amending the tender documents, have been taken into account in this tender offer: *(Attach additional pages if more space is required)*

	Date	Title or Details
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		

Name of Tenderer	Signature	Date

I / We confirm that no communications were received from the South African National Biodiversity Institute before the submission of this tender offer, amending the tender documents.

Name of Tenderer	Signature	Date

T2.1.14: COMPULSORY ENTERPRISE QUESTIONNAIRE

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

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: .....

Tax reference number: .....

Section 6: Record in the service of the state

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

- □ a member of any municipal council
- □ a member of any provincial legislature
- □ a member of the National Assembly or the National Council of Province
- □ a member of the board of directors of any municipal entity
- □ an official of any municipality or municipal entity
- □ an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No 1 of 1999)
- □ a member of an accounting authority of any national or provincial public entity
- □ an employee of Parliament or a provincial legislature

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

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

*Insert separate page if necessary.

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 or 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, in the service of any of the following:

- □ a member of any municipal council
- □ a member of any provincial legislature
- □ a member of the National Assembly or the National Council of Province
- □ a member of the board of directors of any municipal entity
- □ an official of any municipality or municipal entity
- □ an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No 1 of 1999)
- □ a member of an accounting authority of any national or provincial public entity
- □ an employee of Parliament or a provincial legislature

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

*Insert separate page if necessary.

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

(i) authorises the Employer to obtain a tax clearance certificate 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, 2004;

(iii) confirms that no partner, member, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise, has within the last five years been convicted of fraud or corruption;

(iv) confirms that I/we are not associated, linked or involved with any other tendering entities submitting tender offers and have no other relationship with any of the Tenderers or those responsible for compiling the Scope of Work that could cause or be interpreted as a conflict of interest; and

(v) confirms that the contents of this questionnaire are within my personal knowledge and are to the best of my belief both true and correct.

Signed: ..... Date: .....

Name: ..... Position: .....

Enterprise name: .....

T2.1.15: COPY OF INSTALLATION ELECTRICIAN'S REGISTRATION WITH THE DEPARTMENT OF LABOUR (WIREMAN'S LICENSE)

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

A copy of the Wireman's License for the Installation Electrician must be included for evaluation purposes.

PART C: THE CONTRACT
Part C1: Agreement and Contract Data

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS.**
CONTRACT NO:	**G506/2023**

C1.1 Form of Offer and Acceptance

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract for the

TENDER NUMBER: G506/2023: APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS.

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

The tenderer, identified in the Offer signature block, has examined the draft contract as listed in the Acceptance section and agreed to provide this Offer.

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 VAT IS:

(in words) ..... Rand;

R ..... (in figures)

THE OFFERED PRICES ARE AS STATED IN THE PRICING SCHEDULE

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 including the Schedule of Deviations (if any) to the tenderer before the end of the period of validity stated in the Tender Data, or other period as agreed, 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 & signature of witness ..... Date .....

.....

Any reference to words “Bid” or Bidder” herein and/or in any other documentation shall be construed to have the same meaning as the words “Tender” or “Tenderer”.

Acceptance

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

The terms of the Contract are contained in

Part C1 Agreements and Contract Data *[which includes this Agreement]*

Part C2 Pricing Data

Part C3 Scope of Work

Part C4 Site Information

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

Deviations from and amendments to the documents listed in the Tender Data and any Addenda thereto listed in the Tender Schedules, as well as any changes to the terms of the Offer agreed by the Tenderer and the Employer during this process of offer and acceptance, are contained in the Schedule of Deviations attached to and forming part of this Agreement. No amendments to or deviations from the 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 the time required to submit documentation in accordance with clause 5.3.2 of the Contract Data (C1.2) after receiving a completed copy of this Agreement, including the Schedule of Deviations (if any), contact the Employer's agent (whose details are given in the Contract Data) to arrange the delivery of any bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the Conditions of Contract identified in the Contract Data at, or just after, the date this Agreement comes into effect. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this Agreement.

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

Signature(s) .....

Name(s) .....

Capacity .....

For the Employer: .....

.....

.....
(Insert name and address of organisation)

Name & signature of witness ..... Date .....

.....

Any reference to words "Bid" or Bidder" herein and/or in any other documentation shall be construed to have the same meaning as the words "Tender" or "Tenderer".

Schedule of Deviations

1 Subject .....

Details .....

.....

.....

.....

2 Subject .....

Details .....

.....

.....

.....

3 Subject .....

Details .....

.....

.....

.....

4 Subject .....

Details .....

.....

.....

.....

5 Subject .....

Details .....

.....

.....

.....

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

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 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 ....

.....
[Name and address of organisation]

Name and signature of witness ..... Date .....

CONFIRMATION OF RECEIPT

The Tenderer (now Contractor), identified in the Offer part of this Agreement, hereby confirms receipt from the Employer, identified in the Acceptance part of this Agreement, of one fully completed original copy of this Agreement, including the Schedule of Deviations (if any) today:

The..... *[day]*

of ..... *[month]*

20.....*[year]*

at ..... *[place]*

For the Contractor: .....
Signature

.....
Name

.....
Capacity

Signature and name of witness: .....
Signature

.....
Name

PART C: THE CONTRACT
Part C1: Agreement and Contract Data

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

C.1.2 Contract Data

Section C1.2.1: Contract Data: Employer to Contractor (EC)

Employer Addendum Code 2101-EC

For information purposes only. 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 quality 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]

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CONTRACT DATA – EMPLOYER

1.0 CONTRACTING AND OTHER PARTIES

1.1 *[1.2]*	**Employer:**	South African National Biodiversity Institute		
	Postal Address:	Private Bag X101, Silverton, Gauteng	**Code:**	0184
	Physical Address:	Pretoria National Botanical Garden 2 Cussonia Avenue, Brummeria, Gauteng	**Code:**	0184
	Tel no.:	012 843 5000	**Fax no.:**	N/A
	VAT no.			
	E-mail:	sanbi.tenders@sanbi.org.za		
1.2 *[5.1]*	**Principal Agent:**	Virtual Consulting Engineers VCE (Pty) Ltd	**Person:**	Mr. Sizwe Phakathi
	Postal Address:	P.O. Box 323, Groenkloof	**Code:**	0027
	Tel no.:	012 452 0444	**Fax no.:**	N/A
	E-mail:	sizwe@virtualconsulting.co.za		
1.2 *[5.2]*	**Agent (1):**		**Person:**	
	Agent's Service:			
	Postal Address:		**Code:**	
	Tel no.:		**Fax no.:**	
	E-mail:			
1.3 *[5.2]*	**Agent (2):**			
	Agent's Service:			
	Postal Address:		**Code:**	
	Tel no.:		**Fax no.:**	
	E-mail:			
1.4 *[5.2]*	**Agent (3):**		**Person:**	
	Agent's Service:			
	Postal Address:		**Code:**	
	Tel no.:		**Fax no.:**	
	E-mail:			
1.5 *[5.2]*	**Agent (4):**		**Person:**	
	Agent's Service:			

	Postal Address:		**Code:**	
	Tel no.:		**Fax no.:**	
	E-mail:			
1.6 *[5.2]*	**Agent (5):**		**Person:**	
	Agent's Service:			
	Postal Address:		**Code:**	
	Tel no.:		**Fax no.:**	
	E-mail:			
1.7 *[5.2]*	**Agent (6):**		**Person:**	
	Agent's Service:			
	Postal Address:		**Code:**	
	Tel no.:		**Fax no.:**	
	E-mail:			
1.8 *[5.2]*	**Agent (7):**		**Person:**	
	Agent's Service:			
	Postal Address:		**Code:**	
	Tel no.:		**Fax no.:**	
	E-mail:			

1.9 *[5.5]* **Interest of principal agent or other agent in the project.** (Yes / No) **No**

Details where "yes": **N/A**

2.0 CONTRACT AND SITE INFORMATION

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

2.2 *[1.1]* **Works** identification: **APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**

2.3 *[1.1]* Site description: **Lowveld National Botanical Gardens**

2.4 *[15.2.1]* Possession of the **site** is to be given on: (Date)

Within 5 (five) working days after receipt of documentary evidence that:
- **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 *[15.3]*	Period for the commencement of the **works** after the contractor takes possession of the **site:**			(Working days)	**5 (Five)**
2.6 *[15.4], [28.0]*	Completion of the works in **sections** is required.		(Yes / No) **No**	(No. of sections)	**N/A**
2.7 *[3.3], [31.16.2]*	Waiver of the **contractor's** lien or right of continuing possession is required.			(Yes / No)	**Yes**
2.8 *[16.1]*	Defined restrictions to the **site** area. Where "yes" the specific requirements are described below or detailed in the **contract documents**.			(Yes / No)	**No**
2.9 *[16.4]*	Geotechnical investigation of the **site** has been undertaken. Where "yes" the results are included in the **contract documents.**			(Yes / No)	**N/A**
2.10 *[16.6]*	Existing premises will be occupied. Where "yes" the specific requirements are described below or detailed in the **contract documents.**			(Yes / No)	**Yes**
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	Contractor – his cost		
		Option B	Employer – free of charge		
		Option C	Contractor – metered (contractor cost)	(A, B or C)	**B**
2.11.2	**Electricity**	Option A	Contractor – his cost		
		Option B	Employer – free of charge		
		Option C	Contractor – metered (contractor cost)	(A, B or C)	**B**
2.11.3	**Telecom**	Option A	Contractor – his cost		
		Option B	Employer – free of charge		
		Option C	Contractor – metered (contractor cost)	(A, B or C)	**A**
2.11.4	**Ablutions**	Option A	Contractor – his cost		
		Option B	Employer – free of charge		
		Option C	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)	**Yes**

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 Sum Plus 20%**
	With a deductible of:	(Amount)	**R20 000**
3.2 *[10.1.2], [11.1-3], [12.6]*	Supplementary / Special insurance to be effected by:	(Employer / Contractor)	**N/A**
	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)	**R5 000 000 per claim**
	With a deductible of:	(Amount)	**R20 000**
3.4 *[11.1.1]*	Support insurance to be effected by:	(Employer / Contractor)	**N/A**
	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)	**N/A**
	Type:	**N/A**	
	For the sum of:	(Amount)	**N/A**

	With a deductible of:	(Amount)	**N/A**

4.0 PRACTICAL COMPLETION DATES AND PENALTIES

		Date	Penalty Amount
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:	**4 months (incl Builders Holiday) after date of site handover**	**R700-00 per calendar day (Excl. VAT)**

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	Penalty Amount
Section 1	**N/A**	**R**
Section 2	**N/A**	**R**
Section 3	**N/A**	**R**
Section 4	**N/A**	**R**

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)	**Yes**		
5.3 *[3.10]*	The **contractor** shall provide a schedule of rates.	(Yes / No)	**No**	(Addendum No.)	**Refer to Bill of Quantities**
5.4 *[3.11]*	Changes made to **JBCC** standard documents.	(Yes / No)	**Yes**	(Addendum No.)	**Refer to Point 6 below**
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)	**Priced document to be submitted with Tender**		
5.6 *[22.2]*	Work to be undertaken by **direct contractors.**	(Yes / No)	**No**	(Addendum No.)	**N/A**

5.7 *[24.9]* On achievement of practical completion the **contractor** is to hand over all certificates and manuals etc. related to the works.

5.8 *[31.1]*	Interim **payment certificate** to be issued by:	(Date of Month)	**25th**

5.8 *[4.1]* The following items of works shall be designed by the Contractor:

(1)	All guarantees	(2)	Electrical Panels
(3)	Fan, Louvre and Mist System Automation	(4)	
(5)			

6.0 STATE PROVISIONS AND SUBSTITUTIONS

6.1 *Replace the following definitions with:*

"CONSTRUCTION PERIOD" means the period commencing on the date of acceptance of the bid as stated in [15.2.1] And ending on the date of **practical completion**

"**INTEREST"** means the interest 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).

6.2 *[3.6]* *Replace the last sentence with the following:*

The original signed set of contract documents shall be held by the **Employer**.

6.3 *[5.1]* *Replace the clause with the following:*

In terms of the clauses listed hereunder the **Employer** has retained its authority and has not given a mandate to the **Principal Agent**. The **Employer** shall sign all documents in relation to the following clauses:

20.1, 20.7, 26.2.1, 26.3.1, 29.1, 29.2, 29.4.1, 29.4.3, 29.7, 29.8, 32.1, 32.6.2, 32.15, 34.3

Copies of the signed documents shall be provided to the **Principal Agent**.

6.4 *[8.4]* *Replace the clause with the following:*

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.

6.6 *[9.3]* *Add the following clause:*

The **Employer's** rights to claim damages for the **Contractor's** omissions and actions will not be affected.

6.7 *[10.1]* *Replace the clause with the following:*

The **Contractor** shall effect contract works insurances and, where available, supplementary insurance in respect of civil commotion, riot and strike shall be effected for the **works** for the Contractor's all risk and, in addition, covering the **Contractor's** subcontractors. Such insured amounts shall include the full value of materials and goods supplied by the **Employer** to the Contractor. Supplementary insurance shall not be effected where the **Employer** makes such an election as stated in [11.1.2 – 3]

6.8 *Add the following clause:*
[11.2]

The **Contractor** shall effect public liability insurance for not less than the amount and the deductible as stated in [10.1.3]. In addition the **Contractor** shall affect any relevant workmen's compensation or similar insurances as are required by **law**. The **Contractor** shall ensure that his sub-contractors effect their own similar insurances.

6.9 *Add the following clause:*
[11.3]

Should the **Employer** decide that the execution of the works could cause the weakening or interference with the support of the land adjacent to the **site**, the **Employer** shall state in [11.1.1] That the **Contractor** shall effect support insurance

6.12 *Replace the clause with the following:*
[12.3]

Where the **Contractor** fails to effect any of the required insurances or to keep them in force, the **Employer** may cancel this agreement in terms of clause [36.0]

6.13 *Replace the clause with the following:*
[12.4]

Before effecting support insurance in terms of [11.2] the **Contractor** shall engage an engineer or technologist to design and inspect the provision of the necessary support.

6.14 *Replace the clause with the following:*
[14.1]

Security:

The securities to be provided by the **Contractor** are:
(1) Variable construction guarantee
(2) Fixed construction guarantee
(3) Advance payment guarantee

6.14 *Replace the clause with the following:*
[15.2.1]

Give the **Contractor** possession of site within ten (10) **working days** of the commencement of the **construction period** provided that the **Contractor** has complied with the terms of [15.1.1] and [15.1.2]

6.15 *Replace the clause with the following:*
[25.3]

Should the **Principal Agent** not issue a **works completion** list, in terms of [25.1] or [25.2.2], within seven (7) **calendar days** from the end of the inspection period, the **Contractor** shall notify the **Employer** and **Principal Agent**. Should the **Principal Agent** not issue such **works completion** list within seven (7) **calendar days** of such notice, the **Employer** may within seven (7) **calendar days** issue to the **Contractor** a **works completion** list. Should the **Employer**:

6.16 *Replace the clause with the following:*
[25.3.1]

Not issue such **works completion** list within seven (7) **calendar days**, then the **certificate of works completion** shall be deemed to have been issued on the date of expiry of the initial notice period and **works completion** shall be deemed to have been achieved on such date.

6.17 *Replace the clause with the following:*
[25.3.2]

Issue a **works completion** list and the work on the **works completion** list not have been completed or where further **defects** have become apparent, the **Employer** shall forthwith identify such items on the updated **works completion** list and notify the **Contractor**. The **Contractor** shall

repeat the procedure in terms of [25.2.2] until such items have been completed to the satisfaction of the **Employer**.

6.18 *Replace the clause with the following:*
[26.1]

The defects liability period for the works shall commence on the date of works completion and end after three hundred and sixty-five (365) **calendar days** for items stated in the **bills of quantities**.

6.19 *Replace the clause with the following:*
[26.4]

Should the **Principal Agent** not issue a **defects** list in terms of [26.2.2 or 26.3.2], within seven (7) **calendar days** from the end of the **defects** liability period, the **Contractor** shall notify the **Employer** and **Principal Agent**. Should the **Principal Agent** not issue such **defects** list within seven (7) **calendar days** of receipt of such notice, the **Employer** may within seven (7) **calendar days** issue to the **Contractor** a **defects** list. Should the **Employer**:

6.20 *Replace the clause with the following:*
[26.4.1]

Not issue such **defects** list within seven (7) **calendar days**, then the **certificate of final completion** shall be deemed to have been issued on the date of expiry of the initial notice period and **final completion** shall be deemed to have been achieved on such date.

6.21 *Replace the clause with the following:*
[26.4.2]

Issue a **defects** list and the work on the **defects** list has not been completed or where further **defects** have become apparent, the **Employer** shall forthwith identify such items on the updated **defects** list and notify the **Contractor**. The **Contractor** shall repeat the procedure in terms of [26.3.2] until such items have been completed to the satisfaction of the **Employer**

6.22 *Replace the clause with the following:*
[26.6]

A **certificate of final completion** issued in terms of [26.0] shall be *prima facie* evidence as to the sufficiency of the **works** and that the Contractor's obligations in terms of [2.0] and [15.0] have been fulfilled other than for **latent defects**.

6.23 *Replace the clause with the following:*
[27.1]

The **latent defects** liability period shall commence at the start of the **construction period** and end ten (10) years from the date of **final completion** where **final completion** in terms of [26.0] is achieved.

6.24 *Replace the clause with the following:*
[27.2]

Where cancellation of this **agreement** occurs before the achievement of **final completion** the **latent defects** liability period shall end ten (10) years from the date of cancellation.

6.27 *Replace the clause with the following:*
[31.4.2]

A reasonable estimate of the value of **materials and goods** in terms of [31.6] unless the **Employer** elects not to pay for such.

6.29 *Replace the clause with the following:*
[31.9]

The **Employer** shall pay the **Contractor** the amount certified within thirty (30) **calendar days** of the date for issue of the **payment certificate**. Payment shall be subject to the **Contractor** giving the **Employer** a **tax** invoice for the amount due.

6.30 *Replace the last sentence with the following:*
[31.11.2]

The principle agent shall calculate such default interest at 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).

6.31 *Replace the clause with the following:*
[31.12]

Where a **payment certificate** reflects an amount in favour of the **Employer**, the **Contractor** shall pay the amount certified within twenty-one (21) **calendar days** of the date of issue of the **payment certificate**. Where such an amount has not been paid, the **Contractor** shall be liable for default interest and the **Principal Agent** shall include such an amount in the **recovery statement** in terms of [33.0]. Payment shall be subject to the **Employer** giving the **Contractor** a **tax** invoice for the amount due. The **Principal Agent** shall calculate such interest at 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).

6.32 *Replace the clause with the following:*
[34.1]

The **Contractor** shall cooperate with and assist the **Principal Agent** in the preparation of the **final account** by timeously providing all relevant documents on request. The **Principal Agent** shall issue the final account to the **Contractor** within one hundred and twenty (120) **working days**.

6.33 *Add the following clause:*
[34.2]

The **Principal Agent** shall allow the **Employer** twenty (20) **working days**, within the period provided in [34.1] to accept the **final account** before presentation to the **Contractor** in terms of [34.3]

6.34 *Add the following:*
[34.5]

The final payment certificate shall be issued by the **Employer**.

6.35 *Replace the clause with the following:*
[34.9]

The **Employer** shall concurrently with the issue of the final **payment certificate** issue a statement to the **Contractor** showing the total amount of **tax** certified.

6.36 The **Employer** shall pay to the **Contractor** the amount certified for payment in the final **payment**
[34.10] **certificate** within thirty (30) **calendar days** of the date of issue of the final **payment certificate** subject to the **Contractor** giving the **Employer** a **tax** invoice for the amount due.

6.37 *Replace the last sentence with:*
[34.12]

Such interest shall be calculated at 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).

6.38 *Replace the clause with the following:*
[36.1]

The **Employer** may, without prejudice of any other rights available to him, cancel this **agreement** where the **Contractor:**

6.39 *Replace the clause with the following:*
[36.2]

Where the **Contractor** is in default, the **Employer** may notify the **Contractor**, either directly or through the **Principal Agent**, of his default and of the **Employer's** intention to cancel this **agreement** in terms of [36.1], should the default not be remedied.

6.40 *Replace the clause with the following:*
[37.2]

Where the **Employer** considers cancelling this **agreement** in terms of [37.1] the **Employer** shall notify the **Contractor** of the **Employer's** intention to cancel this **agreement**.

6.41 *Add the following clause:*
[39.2]

The **Employer** shall be entitled at any time to unilaterally terminate or cancel this **agreement** or any part thereof. Save for the following the **Contractor** shall not be entitled to claim any other amounts whatsoever in respect of such termination or cancellation of this **agreement**. The **Employer** shall be obliged to pay the **Contractor** as damages and/or loss of profit the lesser of:

6.42 *Add the following clause:*
[39.2.1]

An amount not exceeding ten per cent (10%) of the **contract sum.**

6.43 *Add the following clause:*
[39.2.2]

Ten per cent (10%) of the value of incomplete work.

6.43 *Add the following clause:*
[39.2.3]

The **Contractor's** actual damage or loss as determined by the **Employer** after receipt of evidence substantiating any such damage or loss.

6.44 *Replace the clause with the following:*
[40.2.2]

Litigation where the **Employer** so elects. Institution of the action shall be commenced and process served with one (1) year from the date of existence of the dispute, failing which the dispute shall lapse.

7.0 CHANGES MADE TO THE STANDARD JBCC DOCUMENT

Changes made to the standard JBCC document are listed in section 6 above.

8.0 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 forthwith informed thereof in writing,

……
Principal Agent

……
Date

Section C1.2.2: Contract Data: Contractor to Employer (CE)

Contractor Addendum Code 2101-CE

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.

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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 quality as a definition where information required to be stated in the **contract data** has not been provided.

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5.0	THE TENDER

CONTRACT DATA – CONTRACTOR

1.0 CONTRACTING PARTY

1.1 *[1.2]* **Contractor:** _____

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 *[14.3]*	Variable Construction Guarantee	(Yes / No)	
2.1.2 *[14.4]*	Fixed Construction Guarantee and Payment Reduction	(Yes / No)	
2.1.3 *[14.5]*	Advanced Payment is required. Where "Yes"	Amount	**N/A**
2.1.4 *[14.5]*	An Advance Payment Guarantee to be provided	(Yes / No)	**No**

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 a division of the priced preliminaries 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 value have on preliminaries. Such ad 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.**

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. The **contractor** shall show the periods to which the individual items related with the charge rate for such items by means of a **programme** all to the satisfaction of the **principal agent.**

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)	**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)	**Yes. Refer to EC 6**

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 **one hundred and twenty (120) 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.

5.8	**TENDER SUM COMPILATION**	**Amount**
5.8.1	Tenderer's work including **prime cost amounts**	R
5.8.2	**Employer allowances** stated by the **principal agent**	R
5.8.3	**SUB TOTAL**	R
5.8.4	*Add* **tax** on 5.8.3	R
5.8.5	**TOTAL TENDER SUM inclusive of tax**	R
5.8.6	Tender Sum in words	

Any reference to words "Bid" or Bidder" herein and/or in any other documentation shall be construed to have the same meaning as the words "Tender" or "Tenderer".

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

PART C: THE CONTRACT
Part C1: Agreement and Contract Data

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

C1.3 FORM OF CONSTRUCTION GUARANTEE

C1.3.1 FIXED CONSTRUCTION GUARANTEE - JBCC 2000 PRINCIPAL BUILDING AGREEMENT (Edition 5.0 of July 2007)

To: South African National Biodiversity Institute, Private Bag X101**,** Silverton**,** 0184

Sir,

FIXED CONSTRUCTION GUARANTEE FOR THE EXECUTION OF A CONTRACT IN TERMS OF JBCC 2000 (5.0 EDITION JULY 2007)

1. With reference to the contract between ……(hereinafter referred to as the "**Contractor**") and the **South African National Biodiversity Institute** (hereinafter referred to as the "**Employer**"), **Contract/Tender No: G506/2023** for **APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS** (hereinafter referred to as the "contract") in the amount of

   R ……..(insert amount), ….....

   .....(insert amount in words), (hereinafter referred to as the contract sum),

   I / We, ...

   in my/our Capacity as ..... and hereby

   representing .....

   (hereinafter referred to as the "**Guarantor**") advise that the **Guarantor** holds at the **Employer's** disposal the sum of R....., (insert amount in figures)

   .....(insert amount in words) being 5% of the contract sum (excluding VAT), for the due fulfilment of the contract.

2. The **Guarantor** hereby renounces the benefits of the exceptions *non numeratae punia; non causa debiti; excussionis et divisionis;* and *de duobus vel pluribus reis debendi* which could be pleaded against the enforcement of this guarantee, with the meaning and effect whereof I/we declare myself/ourselves to be conversant, and undertake to the **Employer** the amount guaranteed, on receipt of a written demand from the **Employer** to do so, stating that the **Employer** has a right of recovery against the **Contractor** in terms of 33.0 of the contract.
3. Subject to the above, but without in any way detracting from the **Employer's** rights to adopt any of the procedures provided for in the contract, the said demand can be made by the **Employer**, at any stage prior to the expiry of this guarantee.

4. The amount id by the **Guarantor** in terms of this guarantee may be retained by the **Employer** on condition that upon the issue of the last final **payment certificate**, the **Employer** shall account to the **Guarantor** showing how this amount has been expended and refund any balance due to the **Guarantor**.

5. The **Employer** shall have the absolute right to arrange his affairs with the **Contractor** in any manner which the **Employer** deems fit and the **Guarantor** shall not have the right to claim his release on account of any conduct alleged to be prejudicial to the **Guarantor**. Without derogating from the aforegoing, any compromise, extension of the **construction period**, indulgence, release or variation of the **Contractor's** obligation shall not affect the validity of this guarantee.

6. The **Guarantor** reserves the right to withdraw from this guarantee at any time by depositing the guaranteed amount with the **Employer**, whereupon the Guarantor's liability seizes.

7. This guarantee is neither negotiable nor transferable, and

   (a) must be surrendered to the **Guarantor** at the time when the **Employer** accounts to the **Guarantor** in terms of clause 4 above, or
   (b) shall lapse on the date of the last **certificate of practical completion**.

8. This guarantee shall not be interpreted as extending the **Guarantor's** liability to anything more than payment of the amount guaranteed.

Signed at ..... on this ..... day of ..... 20.....

AS WITNESS

1. .....

2. .....

.....
By and on behalf of

.....

.....

(insert the name and physical address of the Guarantor)

Name: .....

Capacity: .....
(Duly authorised thereto by resolution attached marked Annexure A)

Date: .....

A. No alterations and/or additions of the wording of this form will be accepted.
B. The physical address of the Guarantor must be clearly indicated and will be regarded as the Guarantor's *domicilium citandi et executandi,* for all purposes arising from this guarantee.
C. This GUARANTEE must be returned to: .....
.....

C1.3.2: VARIABLE CONSTRUCTION GUARANTEE - JBCC 2000 PRINCIPAL BUILDING AGREEMENT (Edition 5.0 of July 2007)

To: South African National Biodiversity Institute, Private Bag X101**,** Silverton**,** 0184

Sir,

VARIABLE CONSTRUCTION GUARANTEE FOR THE EXECUTION OF A CONTRACT IN TERMS OF JBCC 2000 (5.0 EDITION JULY 2007)

5. With reference to the contract between ……(hereinafter referred to as the "**Contractor**") and the **South African National Biodiversity Institute** (hereinafter referred to as the "**Employer**"), **Contract/Tender No: G506/2023** for **APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**

(hereinafter referred to as the "contract") in the amount of

R ……..(insert amount), ….....

.....(insert amount in words),
(hereinafter referred to as the contract sum),
I / We, ...

in my/our Capacity as ..... and hereby

representing .....

(hereinafter referred to as the "**Guarantor**") advise that the **Guarantor** holds at the **Employer's** disposal the sum of R....., (insert amount in figures)

.....(insert amount in words)
being 10% of the contract sum (excluding VAT), for the due fulfilment of the contract.

1. I / We advise that the **Guarantor's** liability in terms of this guarantee shall be as follows:

   (a) From and including the date on which this guarantee is issued and up to and including the date of payment of the amount in the last final **payment certificate**, the **Guarantor** will be liable in terms of this guarantee to the maximum amount of 10% of the **contract sum** (excluding VAT);

   (b) The **Guarantor's** liability shall reduce to 3 % of the **contract value** (excluding VAT) as determined at the date of the last **certificate of practical completion**, subject to such amount not exceeding 10% of the **contract sum** (excluding VAT).

   (c) The **Guarantor's** liability shall reduce to 1 % of the **contract value** (excluding VAT) as determined at the date of the last **certificate of final completion**, subject to such amount not exceeding 10 % of the **contract sum** (excluding VAT).

   (d) This guarantee shall expire on the date of the last **final payment certificate**.

   (e) The **practical completion certificate** and the **final completion certificate** referred to in this guarantee shall mean the certificates issued in terms of the contract.

2. The **Guarantor** hereby renounces the benefits of the exceptions *non numeratae punia; non causa debiti; excussionis et divisionis;* and *de duobus vel pluribus reis debendi* which could be pleaded against the enforcement of this guarantee, with the meaning and effect whereof I/we declare myself/ourselves to be conversant, and undertake to y the **Employer** the amount guaranteed on receipt of a written demand from the **Employer** to do so, stating that the **Employer** has a right of recovery against the **Contractor** in terms of 33.0 of the contract.

4. Subject to the above, but without in any way detracting from the **Employer's** rights to adopt any of the procedures provided for in the contract, the said demand can be made by the **Employer** at any stage prior to the expiry of this guarantee.

5. The amount id by the **Guarantor** in terms of this guarantee may be retained by the **Employer** on condition that upon the issue of the last **final payment certificate**, the **Employer** shall account to the **Guarantor** showing how this amount has been expended and refund any balance due to the **Guarantor**.

6. The **Employer** shall have the absolute right to arrange his affairs with the **Contractor** in any manner which the **Employer** deems fit and the **Guarantor** shall not have the right to claim his release on account of any conduct alleged to be prejudicial to the **Guarantor**. Without derogating from the aforegoing, any compromise, extension of the construction period, indulgence, release or variation of the **Contractor's** obligation shall not affect the validity of this guarantee.

7. The **Guarantor** reserves the right to withdraw from this guarantee at any time by depositing the amount guaranteed with the **Employer**, whereupon the **Guarantor's** liability ceases.

8. This guarantee is neither negotiable nor transferable, and

   (a) must be surrendered to the **Guarantor** at the time when the **Employer** accounts to the **Guarantor** in terms of clause 5 above, or
   (b) shall lapse in accordance with clause 2(d) above.

9. This guarantee shall not be interpreted as extending the **Guarantor's** liability to anything more than the payment of the amount guaranteed.

Signed at ..... on this ..... day of .....20.....

AS WITNESS

1. .....

2. .....

.....
By and on behalf of

.....

.....

(insert the name and physical address of the Guarantor)

Name: .....

Capacity: .....
(Duly authorised thereto by resolution attached marked Annexure A)

Date: .....

A. No alterations and/or additions of the wording of this form will be accepted.

B. The physical address of the Guarantor must be clearly indicated and will be regarded as the Guarantor's *domicilium citandi et executandi*, for all purposes arising from this guarantee.

C. This GUARANTEE must be returned to: .....

PART C: THE CONTRACT
Part C1: Agreement and Contract Data

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

C1.4 Occupational Health and Safety Agreement 37(2)

AGREEMENT MADE AND ENTERED INTO BETWEEN THE

.....

(Hereinafter called the **"EMPLOYER"**)

.....

(Contractor / Mandatary / Company / CC Name)

IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT, ACT NO. 85 OF 1993 AS AMENDED

I, ... , representing

..... , as an Employer in its own right, do hereby undertake to ensure, as far as is reasonably practicable, that all work will be performed, and all equipment, machinery or plant used in such a manner as to comply with the provisions of the Occupational Health and Safety Act (OHSA) and the Regulations promulgated there under.

I furthermore confirm that I am / we are registered with the Compensation Commissioner and that all registration and assessment monies due to the Compensation Commissioner have been fully paid or that I / we are insured with an approved licensed compensation insurer.

COID ACT Registration Number: .....

Or Compensation Insurer: ..... Policy No.: .....

I undertake to appoint, where required, suitable competent persons, in writing, in terms of the requirements of OHSA and the Regulations and to charge him / them with the duty of ensuring that the provisions of OHSA and Regulations as well as the Council's Special Conditions of Contract, Way Leave, Lock-Out and Work Permit Procedures are adhered to as far as reasonably practicable.

I further undertake to ensure that any Sub-contractors employed by me will enter into an Occupational Health and Safety Agreement separately, and that such Sub-contractors comply with the conditions set.

I hereby declare that I have read and understand the appended Occupational Health and Safety Conditions and undertake to comply therewith at all times.

I hereby also undertake to comply with the Occupational Health and Safety Specification and Plan.

Signed at ..... this ..... day of .....20.....

....
WITNESS MANDATORY

Signed at ..... this ..... day of .....20.....

....
WITNESS FOR AND ON BEHALF OF THE EMPLOYER

OCCUPATIONAL HEALTH AND SAFETY CONDITIONS

1. The Chief Executive Officer of the Contractor shall assume the responsibility in terms of Section 16(1) of the Occupational Health and Safety Act (as amended). Should the Contractor assign any duty in terms of Section 16(2), a copy of such assignment shall immediately be provided to the representative of the Employer as defined in the Contract.

2. All work performed on the Employer's premises shall be performed under the supervision of the construction supervisor who understand the hazards associated with any work that the Contractor performs on the site in terms of Construction Regulations 2003.

3. The Contractor shall appoint a Competent Person who shall be trained on any occupational health and safety aspect pertaining to them or to the work that is to be performed.

4. The Contractor shall ensure that he familiarises himself with the requirements of the Occupational Health and Safety Act and that he, his employees, and any sub-contractors, comply with them.

5. Discipline in the interests of occupational health and safety shall be strictly enforced.

6. Personal protective equipment shall be issued by the Contractor as required and shall be worn at all times where necessary.

7. Written safe work procedures and appropriate precautionary measures shall be available and enforced, and all employees shall be made conversant with the contents of these practices.

8. No substandard equipment/machinery/articles or substances shall be used on the site.

9. All incidents referred to in terms of Section 24 of the Occupational Health and Safety Act shall be reported by the Contractor to the Department of Labour and the Employer.

10 The Employer hereby obtains an interest in the issue of any formal inquiry conducted in terms of Section 32 of the Occupational Health and Safety Act and into any incident involving a Contractor and/or his employees and/or his Sub-Contractor/s.

11. No use shall be made of any of the Employer's machinery / plant / equipment / substance / personal protective equipment or any other article without prior arrangement and written approval.

12. No alcohol or any other intoxicating substance shall be allowed on the site. Any person suspected of being under the influence of alcohol or any other intoxicating substance shall not be permitted access to, or allowed to remain on the site.

13. Prior to commencement of any work, verified copies of all documents mentioned in the agreement, must be presented to the Employer.

PART C: THE CONTRACT
Part C2: Pricing Data

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

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PART C: THE CONTRACT
Part C2: Pricing Data

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

C2.1 Pricing Instructions

1. GENERAL INFORMATION

a. Bills of Quantities
The **bills of quantities** forms part of and must be read and priced in conjunction with all the other documents forming part of the **contract documents**, the Standard Conditions of Tender, Conditions of Contract, Specifications, Drawings and all other relevant documentation.

b. Value Added Tax
The **contract sum** must include for Value Added Tax (VAT). All rates, provisional sums, etc. in the **bills of quantities** must however be net (exclusive of VAT) with VAT calculated and added to the total value thereof in the Final Summary.

c. Fixed Price Contract
Tenderers are to take note that contract price adjustments are not applicable to this contract. Tenderers should therefore make provision in the **contract sum**, schedule of rates, etc., for possible price increases during the contract period, as no claims in this regard shall be entertained.

2. PRICING INFORMATION

1. These schedules of quantities contain sequentially numbered pages as indicated in the contents list. Tenderers are required to check that the pages in their schedules of quantities are complete. If any pages are duplicated or omitted, or if any quantity or typing is unclear or if the schedules of quantities contain any obvious errors, the tenderer shall immediately notify the engineer so that the problem may be rectified. No responsibility for any errors arising from any of the above shall be accepted by the engineer.

2. The schedules of quantities form part of and shall be read in conjunction with the specification, which contains full description of the work required to be performed and the materials and equipment to be supplied and used in the execution of the works. Tenderers shall refer to the specification for the full meaning and description of work to be executed and materials and equipment to be supplied or used in the execution of the work.

3. Tenders shall be submitted with schedules of quantities completed in full. Non or partial completion of the schedules of quantities shall render tenders liable for disqualification.

4. The total tender price as carried forward to the tender form, after correction for arithmetic extension errors, etc. shall be the contract price as awarded to the successful tenderer. Tenderers are requested to check multiplication and addition of the schedules of quantities. The rate submitted shall be regarded as the price offered per item.

5. No changes, additions or omissions to the contents of the schedules of quantities shall be permitted. If any changes, additions or omissions are made these shall not be recognised and the original wording of the schedules of quantities shall apply.

6. The priced schedules of quantities of tender shall be checked by the principal agent. The principal agent reserves the right to request adjustments to one or more individual tender prices and to rectify contradictions and thereby alter the total tender price as submitted. The acceptance of this tender does not preclude the principal agent from querying or requesting of the contractor to adjust the rates at any stage during the contract period or any extension thereto.

7. The responsibility of the accuracy of the quantities included in the schedules, remains with the person who prepared the schedules. The tenderer is relieved from the responsibility of the measurement of quantities at tender stage and the tender amounts shall be for the quantities as listed in the schedules. It is however expected from the tenderer to include for minor construction items such as would be required for the complete execution of works in accordance with the specification.

8. The quantities in these schedules of quantities shall not be used for the ordering of materials.

9. Changes in the scope of works included in the schedule of quantities shall be permitted and shall be measured and priced at the tariffs as included in the schedules of quantities and shall form an addition to or omission from the total of the schedule of quantities. Any changes not covered by any rates in the schedules of quantities shall be agreed and priced as non-schedule items in accordance with the conditions of contract.

10. The extent and value of variations shall be in accordance with the conditions of contract. Variations to the works prior to the execution thereof shall be priced as above. Variations to work already executed shall not necessarily be priced in accordance with the schedule of quantities and shall be judged individually on merit.

11. Except where the separate rate for the material and labour components of any item is specifically called for, the unit price of such item shall be deemed to include the supply and installation of that item.

    The description of any items shall, except where otherwise specified, allow for the purchase, delivery, off-loading, storage, packing, lifting, placing, positioning and fixing in position, cutting and wastage, dies and patterns, models and equipment, temporary work, return of packing material, fixing costs, profit or other obligations of the contract arising out of the conditions of contract. All items prices shall exclude VAT but include any other tax or levy as applicable.

    All items are measured to the net final quantity as indicated on the drawings with the completed work in the position as indicated on the drawing. All prices and rates shall allow for wastage for whatever reason, irrespective of any other standard measurement which may be currently used elsewhere.

12. Should the contractor identify any additional issues or items which in his opinion are necessary for the complete and proper execution of the works, he shall identify such items in a covering letter attached to his tender and submit rates for these items. Mistakes in the physical measurement of items in the schedules of quantities shall be rectified but no claim shall be considered for the non-measurement of doubtful or minor items or claims resulting of criticism of method of measurement used or descriptions given. The priced schedule of quantities shall not be adjusted on the grounds of the items which in the opinion of the tenderer should have been brought into account unless so detailed in the accompanying letter.

13. The schedule of quantities shall be adjusted to reflect the quantities of materials used on completion of whole or part of the works as a result of remeasurement, qualification or variations. The remeasured quantities shall form the basis for the calculation of payment certificates. Th-e schedules of quantities are not intended for the ordering of materials, etc. and the contractor is advised to extract the quantities for the ordering of materials directly from the drawings and specification. Any order placed directly from the schedules of quantities shall be solely at the contractor's risk.

14. The unit rates as entered in the schedule of quantities with the exclusion of dayworks items shall in

all cases include any present and applicable sales tax or similar statutory duties.

PART C: THE CONTRACT
Part C2: Pricing Data

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

C2.2 Bill of Quantities

Tender No: G506/2023

SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE

APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS PROCUREMENT DOCUMENT

SCHEDULE OF QUANTITIES

NB TENDERES MUST COMPLETE THE SCHEDULE OF QUANTITIES IN BLACK INK

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	MEANING OF TERMS "TENDER / TENDERER" 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" **PRELIMINARIES** The JBCC Preliminaries Code 2101, July 2007 edition for use with the JBCC Principal Building Agreement Edition 5.0 (Reprint 1) Code 2101, July 2007 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" **PRICING OF PRELIMINARIES** 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 Items not priced in these Preliminaries shall be deemed to be included elsewhere in these Bills of Quantities **SECTION A: JBCC PRINCIPAL BUILDING AGREEMENT** **DEFINITIONS**	
A1.0	**DEFINITIONS AND INTERPRETATION** Refer to Contract Data Fixed:_____Value related:_____Time related:_____ **Item**	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	OBJECTIVE AND PREPARATION	
A2.0	**OFFER, ACCEPTANCE AND PERFORMANCE** Clause 2.0 Fixed:_____Value related:_____Time related:_____ **Item**	
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 agen**t and **agents** shall have access at all times Clause 3.11 is amended by replacing the second reference to “principal agent” with the word **“employer”** Fixed:_____Value related:_____Time related:_____ **Item**	
A4.0	**DESIGN RESPONSIBILITY** Clause 4.0 Fixed:_____Value related:_____Time related:_____ **Item**	
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:_____ **Item**	
A6.0	**CONTRACTOR'S SITE REPRESENTATIVE** Clause 6.0 Fixed:_____Value related:_____Time related:_____ **Item**	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
A7.0	**COMPLIANCE WITH LAWS AND 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:_____ **Item**	
A8.0	**WORKS RISK** Clause 8.0 Fixed:_____Value related:_____Time related:_____ **Item**	
A9.0	**INDEMNITIES** Clause 9.0 Fixed:_____Value related:_____Time related:_____ **Item**	
A10.0	**GENERAL INSURANCES** Clause 10.0 Clause 10.0 is amended by the addition of the following clauses: **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 (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** (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 (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	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	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 (b) The **contracto**r 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 **employe**r is legally liable (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 **employe**r 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** (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** (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 **contracto**r 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 **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: **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 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	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	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 The **contractor** shall be liable for and hereby indemnifies the **employe**r 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 **10.7.3** It is the responsibility of the **contracto**r 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 **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 **employe**r and the **contractor** and for this purpose all these contracts shall be considered one indivisible whole Fixed:_____Value related:_____Time related:_____ **Item**	
A11.0	**SPECIAL INSURANCES** Clause 11.0 Fixed:_____Value related:_____Time related:_____ **Item**	
A12.0	**EFFECTING INSURANCES** Clause 12.0 Fixed:_____Value related:_____Time related:_____ **Item**	
A13.0	***No clause***	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
A14.0	**SECURITY** Clause 14.0 Clauses 14.1 - 14.8 are amended by replacing them with the following: 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) 14.1.1 The payment reduction of the value certified in a **payment certificate** shall be mutatis mutandi in terms of 31.8(A) 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** 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 14.3 Where **security** as a cash deposit of ten per cent (10%) of the **contract sum** (excluding VAT) has been selected: 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 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 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 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 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 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	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	14.4 Where security as a variable construction guarantee of ten percent (10%) of the contract sum (excluding VAT) has been selected: 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** 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 14.4.3 The **employer** shall return the variable **construction guarantee** to the **contractor** within fourteen (14) **calendar days** of it expiring 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** 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: 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) 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** 14.5.3 The **employer** shall return the fixed **construction guarantee** to the **contractor** within fourteen (14) **calendar days** of it expiring 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 14.5.5 Where the **employer** has a right of recovery against the **contractor** in terms of the 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 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: 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** 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** 14.6.3 The payment reduction of the value certified in a **payment certificate** shall be mutatis mutandi in terms of 31.8(A) 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 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:	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	14.7.1 The payment reduction of the value certified in a **payment certificate** shall be mutatis mutandi in terms of 31.8(B) 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** 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** 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 **EXECUTION** **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 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** Clause 15.2.1 is amended by replacing it with the following clause: 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:_____ **Item** 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** 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 14.4.3 The **employer** shall return the variable **construction guarantee** to the **contractor** within fourteen (14) **calendar days** of it expiring	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	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** 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: 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) 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** 14.5.3 The **employer** shall return the fixed **construction guarantee** to the **contractor** within fourteen (14) **calendar days** of it expiring 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 14.5.5 Where the **employer** has a right of recovery against the **contractor** in terms of the 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 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: 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** 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** 14.6.3 The payment reduction of the value certified in a **payment certificate** shall be mutatis mutandi in terms of 31.8(A) 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 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: 14.7.1 The payment reduction of the value certified in a **payment certificate** shall be mutatis mutandi in terms of 31.8(B)	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	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** 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** 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 **EXECUTION**	
A15.0	**PREPARATION FOR AND EXECUTION OF THE WORKS** Clause 15.0 Clause 15.1.1 is amended by replacing it with: Clause 15.1.2 is amended by replacing it with: The **security** selected in terms of 14.0 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, (Act 85 of 1993), R84 of February 7, 2014 Construction Regulations that came into effect within twenty-one (21) **calendar days** of **commencement date** Clause 15.2.1 is amended by replacing it with the following clause: 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:_____ **Item**	
A16	**SITE AND ACCESS** Clause 16.0 Fixed:_____Value related:_____Time related:_____ **Item**	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
A17.0	**CONTRACT INSTRUCTIONS** Clause 17.0 Clause 17.1.11 is amended by deleting the words “and the appointment of Fixed:_____Value related:_____Time related:_____ **Item**	
A18.0	**SETTING OUT OF THE WORKS** Clause 18.0 Fixed:_____Value related:_____Time related:_____ **Item**	
A19.0	**TEMPOARARY WORKS AND PLANT** Clause 19.0 Fixed:_____Value related:_____Time related:_____ **Item**	
A20.0	**NOMINATED SUBCONTRACTORS** Clause 20.0 Clause 20.1.3 is amended by replacing it with the following: No clause Fixed:_____Value related:_____Time related:_____ **Item**	
A21.0	**SELECTED SUBCONTRACTORS** Clause 21.0 Clause 21 is amended by replacing it with: No clause Fixed:_____Value related:_____Time related:_____ **Item**	
A22.0	**EMPLOYER’S DIRECT CONTRACTORS** Clause 22.0 Fixed:_____Value related:_____Time related:_____ **Item**	
A23.0	**CONTRACTOR’S DOMESTIC SUBCONTRACTORS** Clause 23.0 Fixed:_____Value related:_____Time related:_____ **Item**	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	COMPLETION	
A24.0	**PRACTICAL COMPLETION** Clause 24.0 Fixed:_____Value related:_____Time related:_____ **Item**	
A25.0	**WORKS COMPLETION** Clause 25.0 Fixed:_____Value related:_____Time related:_____ **Item**	
A26.0	**FINAL COMPLETION** Clause 26.0 Clause 26.1.2 is amended by inserting Fixed:_____Value related:_____Time related:_____ **Item**	
A27.0	**LATENT DEFECTS LIABILITY PERIOD** Clause 27.0 Fixed:_____Value related:_____Time related:_____ **Item**	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
A28.0	**SECTIONAL COMPLETION** Clause 28.0 Fixed:_____Value related:_____Time related:_____ **Item**	
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**	
A30.0	**PENALTY FOR LATE OR NON-COMPLETION** Clause 30.0 Fixed:_____Value related:_____Time related:_____ **Item**	
	PAYMENT	
A31.0	**INTERIM PAYMENT TO THE CONTRACTOR** Clause 31.0 Clause 31.5.2 is amended by replacing “14.7.1” with “14.0” Clause 31.8 is amended by replacing it with the following two alternative clauses: **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: 31.8(A).1 Ninety-five per cent (95%) of such value in interim **payment certificates** issued up to the date of **practical completion** 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** 31.8(A).3 Ninety-nine per cent (99%) of such value in interim **payment certificates** issued on the date of f**inal completion** and up to but excluding the final **payment certificate** in terms of 34.6 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**	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	Alternative B 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: 31.8(B).1 Ninety per cent (90%) of such value in interim **payment certificate**s issued up to the date of **practical completion** 31.8(B).2 Ninety-seven per cent (97%) of such value in interim **payment certificate**s issued on the date of **practical completion** and up to but excluding the date of **final completion** 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 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** Clause 31.12 is amended by deleting the following: Payment shall be subject to the employer giving the contractor a tax invoice for the amount due Fixed:_____Value related:_____Time related:_____ **Item**	
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 **contracto**r" Fixed:_____Value related:_____Time related:_____ **Item**	
A33.0	**RECOVERY OF EXPENSE AND LOSS** Clause 33.0 Fixed:_____Value related:_____Time related:_____ **Item**	
A34.0	**FINAL ACCOUNT AND FINAL PAYMENT** Clause 34.0 Clause 34.1 is amended by removing Clause 34.2 is amended by inserting	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	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:_____ **Item**	
A35.0	**PAYMENT TO OTHER PARTIES** Clause 35.0 Fixed:_____Value related:_____Time related:_____ **Item**	
A36.0	**TERMINATION 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"** Clause 36.0 is amended by the addition of the following clause: Clause 36.0 is amended by the addition of the following clause:\ 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:_____ **Item**	
A37.0	**TERMINATION BY EMPLOYER – LOSS AND DAMAGE** Clause 37.0 Clause 37.3.5 is amended by replacing "ninety (90)" with "one-hundred and twenty (120)" Clause 37.0 is amended by the addition of the following clause:	

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ITEM	DESCRIPTION	AMOUNT
	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**	
A38.0	**TERMINATION 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: 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**	
A39.0	**TERMINATION – 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**	
	DISPUTE	
A40.0	**SETTLEMENT OF DISPUTES** 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**	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
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**	
B2.0	**DOCUMENTS**	
B2.1	***Checking of documents*** Fixed:_____Value related: _____Time related: _____ **Item**	
B2.2	***Provisional bills of quantities*** Fixed:_____Value related: _____Time related: _____ **Item**	
B2.3	***Availability of construction documentation*** Fixed:_____Value related: _____Time related: _____ **Item**	
B2.4	***Interests of agents*** Fixed:_____Value related: _____Time related: _____ **Item**	
B2.5	***Priced documents*** Fixed:_____Value related: _____Time related: _____ **Item**	
B2.6	***Tender submission*** Clause 2.6 is amended by replacing “JBCC Form of Tender” with “The Tender Page 97” Fixed:_____Value related: _____Time related: _____ **Item**	
B3.0	**THE SITE**	
B3.1	***Defined works area***	
B3.2	***Geotechnical investigation*** Fixed:_____Value related: _____Time related: _____ **Item**	
B3.3	***Inspection of the site*** Fixed:_____Value related: _____Time related: _____ **Item**	
B3.4	***Existing premises occupied*** Fixed:_____Value related: _____Time related: _____ **Item**	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
B3.5	***Previous work – dimensional accuracy***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B3.6	***Previous work – defects***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B3.7	***Services – known***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B3.8	***Services – unknown***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B3.9	***Protection of trees***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B3.9	***Protection of trees***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B3.10	***Articles of value***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B3.11	***Inspection of adjoining properties***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B4. 0	**MANAGEMENT OF CONTRACT**	
B4.1	***Management of the works***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B4.2	***Programme for the works***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B4.3	***Progress meetings***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B4.4	***Technical meetings***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B4.5	***Labour and plant records***	
	Fixed:_____Value related: _____Time related: _____ **Item**	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
B5.0	**SAMPLES, SHOP DRAWINGS AND MANUFACTURERS' INSTRUCTIONS**	
B5.1	***Samples of materials***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B5.2	***Workmanship samples***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B5.3	***Shop drawings***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B5.4	***Compliance with manufacturers' instructions***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B6.0	**TEMPORARY WORKS AND PLANT**	
B6.1	***Deposits and fees***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B6.2	***Enclosure of the works***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B6.3	***Advertising***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B6.4	**Plant, equipment, sheds and offices**	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B6.5	***Main notice board***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B6.6	***Subcontractors' notice board***	
	Fixed:_____Value related: _____Time related: _____ **Item**	
B7.0	**TEMPORARY SERVICES**	
B7.1	***Location***	
	Fixed:_____Value related: _____Time related: _____ **Item**	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
B7.2	***Water***	
	Fixed:_____Value related: _____Time related: _____	
	Item	
B7.3	***Electricity***	
	Fixed:_____Value related:_____Time related:_____	
	Item	
B7.4	***Telecommunication facilities***	
	Fixed:_____Value related: _____Time related: _____	
	Item	
B7.5	***Ablution facilities***	
	Fixed:_____Value related: _____Time related: _____	
	Item	
B8.0	**PRIME COST AMOUNTS**	
B8.1	***Responsibility for prime cost amounts***	
	Fixed:_____Value related: _____Time related: _____	
	Item	
B9.0	**ATTENDANCE ON N/S SUBCONTRACTORS**	
B9.1	***General attendance***	
	Fixed:_____Value related: _____Time related: _____	
	Item	
B9.2	***Special attendance***	
	Fixed:_____Value related: _____Time related: _____	
	Item	
B9.3	***Commissioning – fuel, water and electricity***	
	Fixed:_____Value related: _____Time related: _____	
	Item	
B10.0	***FINANCIAL ASPECTS***	
B10.1	***Statutory taxes, duties and levies***	
	Fixed:_____Value related: _____Time related: _____	
	Item	
B10.2	***Payment for preliminaries***	
	Fixed:_____Value related: _____Time related: _____	
	Item	
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	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
B10.4	***Payment certificate cash flow*** Fixed:_____Value related: _____Time related: _____ **Item**	
B11.0	**GENERAL**	
B11.1	***Protection of the works*** Fixed:_____Value related: _____Time related: _____ **Item**	
B11.2	***Protection / isolation of existing / sectionally occupied works*** Fixed:_____Value related: _____Time related: _____ **Item**	
B11.3	***Security of the works*** Fixed:_____Value related: _____Time related: _____ **Item**	
B11.4	***Notice before covering work*** Fixed:_____Value related: _____Time related: _____ **Item**	
B11.5	***Disturbance*** Fixed:_____Value related: _____Time related: _____ **Item**	
B11.6	***Environmental disturbance*** Fixed:_____Value related: _____Time related: _____ **Item**	
B11.7	***Works cleaning and clearing*** Fixed:_____Value related: _____Time related: _____ **Item**	
B11.8	***Vermin*** Fixed:_____Value related: _____Time related: _____ **Item**	
B11.9	***Overhand work*** Fixed:_____Value related: _____Time related: _____ **Item**	
B11.10	***Instruction manuals and guarantees*** Fixed:_____Value related: _____Time related: _____ **Item**	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
B11.11	***As built information*** Fixed:_____Value related: _____Time related: _____ **Item**	
B11.12	**Tenant installations** Fixed:_____Value related: _____Time related: _____ **Item**	
B12.0	**SCHEDULE OF VARIABLES**	
B12.1	***Schedule of variables*** 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**	
12,1,1	**PRE-TENDER INFORMATION** ***Refer to Contract Data***	
12,1,2	**POST-TENDER INFORMATION** ***Refer to Contract Data***	
	Fixed:_____Value related: _____Time related: _____ **Item**	

SCHEDULE NO 1: PRELIMINARY AND GENERAL (SECTION C)

ITEM	DESCRIPTION	AMOUNT
	SECTION C: SPECIFIC PRELIMINARIES **Section C** contains specific preliminary items which apply to this contract except where N/A (Not Applicable) appears against an item	
C1.0	**CONTRACT DRAWINGS** * Select relevant paragraph and delete whichever is not applicable depending on whether the contract is based on a ***bills of quantities*** or ***lump sum document*** * The drawings issued with the tender documents do not comprise the complete set but serve as a guide only for tendering purposes and for indicating the scope of the work to enable the tenderer to acquaint himself with the nature and extent of the **works** and the manner in which they are to be executed Should any part of the drawings not be clearly understood by the tenderer he shall, before submitting his tender, obtain clarification in writing from the **principal agent** Fixed:_____Value related: _____Time related: _____ **Item**	
C2.0	**PREAMBLES** The Specifications shall be read in conjunction with the **bills of quantities / lump sum document** and be referred to for the full descriptions of work to be done and materials to be used The speciifications are issued and shall be read in conjunction with the drawings and the **bills of quantities / lump sum document** Fixed:_____Value related: _____Time related: _____ **Item**	
C3.0	**TRADE NAMES** Wherever a trade name for any product has been described in the **bills of quantities / lump sum document**, the tenderer's attention is drawn to the fact that any other product of equal quality may be used subject to the written approval of the **principal agent** being obtained prior to the closing date for submission of tenders If prior written approval for an alternative product is not obtained, the product described shall be deemed to have been tendered for Fixed:_____Value related: _____Time related: _____ **Item**	
C4.0	**IMPORTED MATERIALS AND EQUIPMENT** Where imported items are listed in the tender documents, the tenderer shall provide all the information called for, failing which the price of any such item, materials or equipment shall be excluded from currency fluctuations. (refer to Annexure D Imported Content Declaration) Notwithstanding any provisions elsewhere regarding the adjustment of contract prices, the price of any item, material or equipment listed in terms of this clause shall be excluded from the Contract Price Adjustment Provisions (if applicable) Fixed:_____Value related:_____Time related:_____ **Item**	

SCHEDULE NO 1: PRELIMINARY AND GENERAL (SECTION C)

ITEM	DESCRIPTION	AMOUNT
C4.0	**IMPORTED MATERIALS AND EQUIPMENT** Where imported items are listed in the tender documents, the tenderer shall provide all the information called for, failing which the price of any such item, materials or equipment shall be excluded from currency fluctuations. (refer to Annexure D Imported Content Declaration) Notwithstanding any provisions elsewhere regarding the adjustment of contract prices, the price of any item, material or equipment listed in terms of this clause shall be excluded from the Contract Price Adjustment Provisions (if applicable) Fixed:_____Value related:_____Time related:_____ **Item**	
C5.0	**OCCUPATIONAL HEALTH AND SAFETY ACT** The **contractor** shall comply with all the requirements as set out in the Construction Regulations, 2014 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 / lump sum document** 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 0,1 Preparartion of Health and Safety Plan. Impleamentation and maintenance of Health and Safety Plan Fixed:_____Value related:_____Time related:_____ **Item** 0,2 Health and Safety Training. Implementation and maintenance of Training Fixed:_____Value related:_____Time related:_____ **Item** 0,3 Personal Protective Clothing and equipment. Maintenance of Personal Protective Clothing and Equipment Fixed:_____Value related:_____Time related:_____ **Item**	

SCHEDULE NO 1: PRELIMINARY AND GENERAL (SECTION C)

ITEM	DESCRIPTION	AMOUNT
	0,4 Fences, Signs and Barricades. Maintenance of Fence, Signs and Barricades Fixed:_____Value related:_____Time related:_____ **Item** 0,5 Establishment of Safety Administration. Implementation and maintenance of Safety Administration Fixed:_____Value related:_____Time related:_____ **Item** 0,6 Other Health and Safety Fixed-charge Obligations. Other Health and Safety Time-Related Obligations Fixed:_____Value related:_____Time related:_____ **Item**	
C6.0	**COVID-19 GUIDELINES** The **contractor** shall comply with all the requirements as set out in the Construction Regulations, 2014 issued under the Occupational Health and Safety Act, 1993 (Act No 85 of 1993), in conjunction with the Hazardous Biological Agents Regulation. It is required of the **contractor** to thoroughly study the COVID-19 Specification that must be read together with and is deemed to be incorporated under this Section of the **bills of quantities / lump sum document** 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 COVID-19 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 0,1 Appointment of COVID-19 awareness champion Fixed:_____Value related:_____Time related:_____ **Item** 0,2 Arranging awareness workshops Fixed:_____Value related:_____Time related:_____ **Item** 0,3 Providing Sanitizing/ Washing facilities Fixed:_____Value related:_____Time related:_____ **Item** 0,4 Provide notices and posters Fixed:_____Value related:_____Time related:_____ **Item** 0,5 Provide screening facility Fixed:_____Value related:_____Time related:_____ **Item**	

SCHEDULE NO 1: PRELIMINARIES AND GENERAL

COLLECTION Item		Page	AMOUNT
	SECTION A: JBCC PRINCIPAL BUILDING AGREEMENT		
	Definitions		
A1.0	Definitions and interpretation	1.1-2	
	Objective and Preparation		
A2.0	Offer, acceptance and performance	1.1-3	
A3.0	Documents	1.1-3	
A4.0	Design responsibility	1.1-3	
A5.0	Employer's agents	1.1-3	
A6.0	Contractor's Site representative	1.1-3	
A7.0	Compliance with laws and regulations	1.1-3	
A8.0	Works risk	1.1-4	
A9.0	Indemnities	1.1-4	
A10.0	General insurances	1.1-4	
A11.0	Special insurances	1.1-6	
A12.0	Effecting insurances	1.1-6	
A13.0	Assignment	1.1-6	
A14.0	Security	1.1-6	
	Execution		
A15.0	Preparation for and execution of the works	1.1-11	
A16.0	Site and Access	1.1-11	
A17.0	Contract instructions	1.1-11	
A18.0	Setting out of the works	1.1-11	
A19.0	Temporary Works and Plant	1.1-11	
A20.0	Nominated subcontractors	1.1-12	
A21.0	Selected subcontractors	1.1-12	
A22.0	Employer's direct contractors	1.1-12	
A23.0	Contractor's domestic subcontractors	1.1-12	
	Completion		
A24.0	Practical completion	1.1-12	
A25.0	Works completion	1.1-12	
A26.0	Final completion	1.1-12	
A27.0	Latent defects liability period	1.1-13	
A28.0	Sectional completion	1.1-13	
A29.0	Revision of date for practical completion	1.1-13	
A30.0	Penalty for late or non-completion	1.1-13	
	Payment		
A31.0	Interim payment to the contractor	1.1-13	
A32.0	Adjustment to the contract value	1.1-14	
A33.0	Recovery of expense and loss	1.1-14	
A34.0	Final account and final payment	1.1-14	
A35.0	Payment to other parties	1.1-15	
		Carried forward R	

SCHEDULE NO 1: PRELIMINARIES AND GENERAL

COLLECTION Item		Page	AMOUNT
	Cancellation		
A36.0	Termination by employer – contractor's default	1.1-15	
A37.0	Termination by employer – loss and damage	1.1-15	
A38.0	Termination by contractor – employer's default	1.1-16	
A39.0	Termination – cessation of the works	1.1-16	
	Dispute		
A40.0	Settlement of disputes	1.1-16	
	SECTION B: JBCC PRELIMINARIES		
B1.0	Definitions and interpretation		
B1.1	Definitions and interpretation	1.1-17	
B2.0	**Documents**		
B2.1	Checking of documents	1.1-17	
B2.2	Provisional bills of quantities	1.1-17	
B2.3	Availability of construction documentation	1.1-17	
B2.4	Interests of agents	1.1-17	
B2.5	Priced documents	1.1-17	
B2.6	Tender submission	1.1-17	
B3.0	**The Site**		
B3.1	Defined works area	1.1-17	
B3.2	Geotechnical investigation	1.1-17	
B3.3	Inspection of the site	1.1-17	
B3.4	Existing premises occupied	1.1-17	
B3.5	Previous work – dimensional accuracy	1.1-18	
B3.6	Previous work – defects	1.1-18	
B3.7	Services – known	1.1-18	
B3.8	Services – unknown	1.1-18	
B3.9	Protection of trees	1.1-18	
B3.10	Articles of value	1.1-18	
B3.11	Inspection of adjoining properties	1.1-18	
B4.0	**Management of contract**		
B4.1	Management of the works	1.1-18	
B4.2	Programme for the works	1.1-18	
B4.3	Progress meetings	1.1-18	
B4.4	Technical meetings	1.1-18	
B4.5	Labour and plant records	1.1-18	
		Carried forward R	

SCHEDULE NO 1: PRELIMINARIES AND GENERAL

COLLECTION Item		Page	AMOUNT
B5.0	**Samples, shop drawings and manufacturers' instructions**		
B5.1	Samples of materials	1.1-19	
B5.2	Workmanship samples	1.1-19	
B5.3	Shop drawings	1.1-19	
B5.4	Compliance with manufacturers' instructions	1.1-19	
B6.0	**Temporary works and plant**		
B6.1	Deposits and fees	1.1-19	
B6.2	Enclosure of the works	1.1-19	
B6.3	Advertising	1.1-19	
B6.4	Plant, equipment, sheds and offices	1.1-19	
B6.5	Main notice board	1.1-19	
B6.6	Subcontractors' notice board	1.1-19	
B7.0	**Temporary services**		
B7.1	Location	1.1-19	
B7.2	Water	1.1-20	
B7.3	Electricity	1.1-20	
B7.4	Telecommunication facilities	1.1-20	
B7.5	Ablution facilities	1.1-20	
B8.0	**Prime cost amounts**		
B8.1	Responsibility for prime cost amounts	1.1-20	
B9.0	**Attendance on N/S subcontractors**		
B9.1	General attendance	1.1-20	
B9.2	Special attendance	1.1-20	
B9.3	Commissioning – fuel, water and electricity	1.1-20	
B10	**Financial aspects**		
B10.1	Statutory taxes, duties and levies	1.1-20	
B10.2	Payment for preliminaries	1.1-20	
B10.3	Adjustment of preliminaries	1.1-20	
B10.4	Payment certificate cash flow	1.1-21	
B11.0	**General**		
B11.1	Protection of the works	1.1-21	
B11.2	Protection / isolation of existing / sectionally occupied works	1.1-21	
B11.3	Security of the works	1.1-21	
B11.4	Notice before covering work	1.1-21	
B11.5	Disturbance	1.1-21	
B11.7	Works cleaning and clearing	1.1-21	
B11.8	Vermin	1.1-21	
B11.9	Overhand work	1.1-21	
B11.10	Instruction manuals and guarantees	1.1-21	
B11.11	As built information	1.1-22	
B11.12	Tenant installations	1.1-22	
		Carried forward R	

SCHEDULE NO 1: PRELIMINARIES AND GENERAL

COLLECTION Item		Page	AMOUNT
B12.0	**Schedule of Variables**		
B12.1	Schedule of variables	1.1-22	
	SECTION C: JBCC PRELIMINARIES		
C1.0	Contract drawings	1.1-23	
C2.0	Preambles	1.1-23	
C3.0	Trade names	1.1-23	
C4.0	Imported materials and equipment	1.1-24	
C5.0	Occupational Health and Safety Act	1.1-24	
C6.0	COVID-19	1.1-25	
	SECTION 1 PRELIMINARIES		
	CARRIED TO FINAL SUMMARY	R	

SUBTOTALS:	
Category: Fixed R	
Category: Value R	
Category: Time R	

APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS PROCUREMENT DOCUMENT

SCHEDULE 2: CIVIL, STRUCTURAL AND BUILDING RELATED REPAIR WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	200,00	**SCHEDULE 2: CIVIL, STRUCTURAL AND BUILDING RELATED REPAIR WORK**				
	200,01	The equipment noted in the descriptions are indicated for the purpose of the description and does not intend that the particular name or company should be used. The Tenderer may offer equipment similar to those mentioned.				
	201,00	**CARPENTRY AND JOINERY FOR ROOFS**				
BB.04	**201,01**	**Remove existing joinery items by length:**				
		.01 Fascia's and barge boards	m	25		
		.02 Timber purlins	m	82		
BB.01	**201,02**	**Structural Timber: Supply and Install new items measured by length:**				
		.01 225 x 10 mm Thick pressed fibre-cement fascia, including painting, etc.	m	25		
		.02 75 x 50 mm SAP purlins	m	82		
BB.08	**201,03**	**Painting of existing members in overhangs:**				
		.01 Members with paint	m	150		
	202,00	**CLADDING AND SHEETING**				
BA.03	**202,01**	**Carefully remove existing cladding and sheeting**				
		.01 Existing roof sheeting covering removed from timber or steel purlins or girts	m^2	78		
	202,02	**Supply and install cladding and sheeting:**				
		.01 2mm Thick IBR or equivalent approved Polycarbonate UV Stabalised Clear sheeting, with 90% light transmission similar to PALRAM SUNTUF6500 IBR 686 :				
		,01 Roof covering or side cladding, fixed to timber or steel purlins.	m^2	78		
Carried forward						

APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS PROCUREMENT DOCUMENT

SCHEDULE 2: CIVIL, STRUCTURAL AND BUILDING RELATED REPAIR WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
Brought forward						
BA.06	**202,03**	**Supply and install sundry items, etc.:**				
		.01 2mm Thick IBR or equivalent approved Polycarbonate UV Stabalised Clear sheeting complete as detailed in BA 03.01:				
		.01 Ridge flashing for polycarbonate IBR sheeting	m	21		
		.02 Roof closures for polycarbonate IBR sheeting	m	21		
SANS 1200 DA	**203,00**	**EARTHWORKS**				
8.3.2		.01 Excavate for restricted foundation, footings and trenches in all materials and use for backfill or embankment or dispose	m^3	6		
BD.05		.02 Break up, hack of and remove existing concrete floors/bases	m^3	6		
		.03 Rip and compaction of existing material to minimum of 93% of modified AASHTO maximum density	m^3	17		
SANS 1200 DA 8.3.4		.04 Importing, placing and compacting approved G6 material in layers of 150mm from commercial sources or from borrow pits to 95% MOD AASHTO	m^3	11		
SANS 1200 G	**204,00**	**CONCRETE FLOOR AND SCREED**				
8.4.3		.01 Class 25 MPa / 19mm concrete in floor slabs up to 150mm thick including rough formwork as in 8.2.1	m^3	6		
BE.01		.02 50 mm thick granolithic screed finish, includes chipping and make good of existing concrete, 4 x 4 panels	m^3	16		
		.03 Non shrinking grout to repair damaged surfaces and areas (sika 212 or similar approved)	l	60		
Carried forward						

APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS PROCUREMENT DOCUMENT

SCHEDULE 2: CIVIL, STRUCTURAL AND BUILDING RELATED REPAIR WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
Brought forward						
8.4.4	**205,00**	**Unformed surface finishes:**				
		.01 Wood-floated finishes measured per area to:				
		.01 Floors	m²	24		
		.02 Smooth finishes measured per area to:				
		.01 Floors	m²	302		
SANS 1200 G	**206,00**	**SCHEDULED REINFORCEMENT ITEMS**				
8.3.2	**206,01**	**High-tensile welded mesh in the following:**				
		.01 Ref no 395 mesh (200mm x 200mm) in aprons/floors	m²	235		
	207,00	**Allowance for existing structures alterations**				
		.01 Allow PC Sum for pump station shelter	PC Sum	-	-	30 000,00
		.01 Profit and attendance for item mentioned above	%	30 000,00	……%	
		.02 Allow PC Sum for Alteration to glass house	PC Sum	-	-	100 000,00
		.01 Profit and attendance for item mentioned above	%	100 000,00	……%	
TOTAL SCHEDULE 2: CARRIED TO TENDER SUM						

APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS PROCUREMENT DOCUMENT

SCHEDULE 3: MECHANICAL WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	300,00	**SCHEDULE 3: MECHANICAL WORK**				
	300,01	The equipment noted in the descriptions are indicated for the purpose of the description and does not intend that the particular name or company should be used. The Tenderer may offer equipment similar to those mentioned.				
	301,00	**IRRIGATION**				
PAA.03	**301,01**	**Isolate, Decommissioning and Stripping of Irrigation Piping and Accessories**				
		.01 25 mm ø piping including supports and fittings	m	190		
PAA.07	**301,02**	**Supply, installation, testing and commissioning of water piping installation:**				
		.01 Copper piping Class 2 with capillary soldered type joints. This shall include cutting, preparing, welding, cleaning, bracketing, testing and all required fittings, bends, tee's for the following pipe sizes:				
		.01 15-22 mm ø including fittings, brackets etc	m	185		
		.02 28-35 mm ø including fittings, brackets etc	m	12		
		.03 54 mm ø including fittings, brackets etc	m	10		
		.02 Extra on piping for welded or screwed pipe fittings, bush, reducing bush, elbow, bend, Tee, Reducing T, Flange set, etc. for the following copper pipe sizes				
		.01 28 mm dia. Fittings, bend, tee, reducing tee etc.	No	6		
		.02 35 mm dia. Fittings, bend, tee, reducing tee etc.	No	4		
		.03 54 mm dia. Fittings, bend, tee, reducing tee etc.	No	4		
Carried forward						

APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS PROCUREMENT DOCUMENT

SCHEDULE 3: MECHANICAL WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
Brought forward						
		.03 Isolation valves for cold water piping:				
		.01 15-22 mm ø isolation valve	No	20		
		.02 28-35 mm ø isolation valve	No	2		
		.03 54 mm ø isolation valve	No	3		
		.04 Solenoid valves for cold water piping:				
		.01 15-22 mm ø isolation valve	No	17		
		.02 54 mm ø isolation valve	No	1		
		.05 Irrigation sprinkler for cold water piping:				
		.01 Wetting radius 0.35 m, operating pressure 1.25 bar, sprinkler nozzle size 0.9 mm²	No	4		
		.02 Wetting radius 0.4 m, operating pressure 1.25 bar, sprinkler nozzle size 1 mm²	No	88		
		.03 Wetting radius 0.3 m, operating pressure 1 bar, sprinkler nozzle size 0.9 mm²	No	6		
		.04 Wetting radius 0.75 m, operating pressure 2 bar, sprinkler nozzle size 0.82 mm	No	36		
		.05 Wetting radius 0.6 m, operating pressure 1.5 bar, sprinkler nozzle size 1.5 mm²	No	24		
		.06 Irrigation Filters:				
		.01 130 mm PVC Filter	No	4		
		.02 200 mm PVC Filter	No	2		
		.07 Pressure Gauges:				
		.01 From Ranges 0 to 5 bar	No	8		
Carried forward						

APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS PROCUREMENT DOCUMENT

SCHEDULE 3: MECHANICAL WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
Brought forward						
		.08 Water Meters:				
		.01 20-25 mm Smart Water Meter	No	2		
		.02 50-54 mm Smart Water Meter	No	1		
		.09 Strainers:				
		.01 20-25 mm Brass Strainer	No	2		
		.02 50-54 mm Brass Strainer	No	1		
		.10 Booster Pumps:				
		.01 Domestic water 0.37 kW - 1.1 kW booster pump with automatic controls	No	1		
		.02 Domestic water 1.1-2.2 kW booster pump with automatic controls	No	1		
		.11 Pressure Vessel/Hydrosphere:				
		.01 Domestic water 25L horizontal pressure vessel/hydrosphere, max pressure 10 bar	No	1		
		.01 Domestic water 50L horizontal pressure vessel/hydrosphere, max pressure 10 bar	No	1		
		.12 Check Valves				
		.01 20 - 25 mm Check Valve	No	2		
		.01 50-54 mm Check Valve	No	1		
		.13 Pressure reggulator				
		.01 20 - 25 mm Brass/Stainless Steel Pressure regulator	No	7		
SC12.03	**301,03**	**Testing and Commissioning of Irrigation**				
		.01 Complete system with sprinklers, pumps, tank and all fittings and accessories	No	3		
Carried forward						

APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS PROCUREMENT DOCUMENT

SCHEDULE 3: MECHANICAL WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
Brought forward						
	302,00	**<u>SOIL HEATERS</u>**				
	302,01	**Supply, installation, testing and commissioning of soil heating installation:**				
		.01 3 mm ø soil heating wires w/ PVC jacket, alumimium earth shield, fibreglass reinforcement cable, 200 ˚C rated teflon insulation, litzer style twin spiral resistance wires, loading capacity 17 W/m	m	1 440		
		.02 Programmable Thermostat to suit soil heating wire installation and provide 0 to 30 ˚C range on soil, approximately 3,600 W output	No	14		
	302,02	**Isolate, Decommissioning and Stripping of Fans and Accessories**				
		.01 Fan, frame and accessories of dimensions 1,500 mm (W) x 1,500 mm (H), 800 mm (B)	No	3		
SC12.03	**302,03**	**Supply, installation, testing and commissioning of fan installation:**				
		.01 Belt driven fan capable of 12,500 m³/h minimum, made from aluminium or stainless steel, with louvres and shutters as an option, for greenhouse applications, high airflow, high efficiency propeller, low noise and vibration, motor protection rating IP55 minimum, sealed for life bearings and class F insulation, operating temperature maximum 50 ˚C, including cabling to panel and thermostat	No	3		
		.02 Extra over on fan installation: Programmable thermostat w/ operating temperature range of 0 to 50˚C	No	3		
Carried forward						

APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS PROCUREMENT DOCUMENT

SCHEDULE 3: MECHANICAL WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
Brought forward						
		.03 Louvres with adjustable blades for opening and closing blades, total area of louvres is 20.5 m², motorised adjustable blades controlled by activation of mist system and thermostat, complete with cables to panel, width across greenhouse to cover approximately 12.55 m, maximum height of louvres 1.75 m, made from Aluminium	Sum	-	-	
	303,00	**MIST SYSTEM**				
	303,01	**Supply, installation, testing and commissioning of mist installation:**				
		.01 Mist nozzles, stainless steel tip, brass adapter, 1/8" size, male connector, integral 100 mesh strainer, very fine, fog-like mist, flow rate 1.5 l/h at 3 bar	No	8		
	304,00	**OPERATING AND MAINTENANCE MANUALS:**				
SB 06.01	**304,01**	**Compile and supply a complete set of operating and maintenance manuals:**				
		.01 Mist, Germination and Glass House Systems	Sum	-	-	
TOTAL SCHEDULE 3: CARRIED TO TENDER SUM						

G506/2023

APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS PROCUREMENT DOCUMENT

SCHEDULE NO 4: ELECTRICAL WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	400,00	**BUILDING ELECTRICAL REPAIR WORK**				
		DISTRIBUTION BOARDS				
AB.01.02	**400,01**	**Supply and Install distribution board:**				
		.01 Supply and Install Main Distribution Board with faceplate, doors, earth bar and neutral bar etc. Switchgear measured separately.	PC Sum	-	-	85 000,00
		.02 Attendance and Profit	%	85 000	.....%	
		.03 Supply and Install Control Board for Germination House	PC Sum	-	-	50 000,00
		.04 Attendance and Profit	%	50 000	.....%	
		.05 Supply and Install flush mounted 24Way D.B Board for Mist House complete with faceplate, doors, earth bar and neutral bar etc. Switchgear measured separately.	No	1		
AB.01.13	**400,02**	**Supply and installation of circuit breakers (SABS approved):**				
		.01 10A, 6kA single pole	No	6		
		.02 20A, 6kA single pole	No	12		
		.03 10-40A, 6kA triple pole	No	2		
		.04 45-63A, 6kA triple pole	No	1		
AB.01.14	**400,03**	**Supply and installation of isolators (SABS approved):**				
		.01 60A, 6kA triple pole	No	2		
		.02 150A three pole large frame 15kA -25kA	No	1		
Carried forward						

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
Brought forward						
AB.01.15	**400,04**	**Supply and install contactors:**				
		.01 30A, 3 pole	No	3		
AB.01.16	**400,05**	**Supply and install switching timers:**				
		.01 Electronic QAT-R-type time switch with 24hr time reserve	No	1		
AB.01.17	**400,05**	**Supply and install earth leakage units (SABS approved):**				
		.01 60A, 5kA double pole (Isolator Type)	No	2		
		.05 60A, 5kA tripple pole (Isolator Type)	No	1		
AB.01.19	**400,06**	**Supply and install surge arrestors:**				
		.01 3 Pole and Neutral 275V 5kA with indication	No	2		
AB.01.11	**400,07**	**Supply and install earth continuity conductor:**				
		.01 50 mm² BCEW	m	16		
		.02 9.5 mm² aluminium	m	12		
AB.01.12	**400,08**	**Terminate earth continuity conductor:**				
		.01 50 mm² BCEW	No	16		
		.02 9.5 mm² aluminium	No	8		
	401,00	**WIRING**				
AB.01.04	**401,01**	**Supply and Install wiring :**				
		.01 1,5 mm² PVC insulated	m	100		
		.02 2.5 mm² PVC insulated	m	400		
		.03 1,5 mm² BCEW	m	50		
		.04 2.5 mm² BCEW	m	200		
		.05 2.5 mm² 3 core surfix cable	m	240		
Carried forward						

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
Brought forward						
AB.02.03	**402,00**	**Supply and Install luminaire:**				
		.01 Type A: 43W IP65 SABS LED Luminaire - Beka Vapourline Type : VLNLED 43N With Watertight Diffuser or Similar Approved	No	8		
		.02 Type B: 30W IP65 SABS LED Luminaire - Beka Vapourline Type : VLNLED 30N With Watertight Diffuser or Similar Approved	No	6		
		.03 Type C: 13W LED Bulkhead Luminaire - Beka Type Series 30 Or Similar Approved	No	2		
		.04 TYPE D: 195W LED flood light luminaire with IP-65 rating similar or equal approved to Beka Omnistar-Eco MC2081N5366A1GS stirrup mounted	No	3		
AB.02.04	**402,01**	**Supply and Install light switch:**				
		.01 16A, one lever, one way	No	1		
		.02 16A, two lever, one way	No	1		
		.03 16A, IP67 one lever, two way surface mounted	No	4		
AB.02.05	**402,02**	**Supply and Install Photo-electric switch:**				
		.01 16A unit with bracket and mounted in dummy bulkhead fitting	No	1		
	403,00	**POWER OUTLETS**				
AB.03.01	**403,01**	**Supply and Install socket outlet:**				
		.01 16A, single SSO	No	1		
		.02 16A, double SSO	No	1		
		.03 16A, single SSO with two switched Euro sockets	No	2		
		.04 6A USO for Lights installed in round box	No	6		
		.05 16A, IP67 Single surface mounted switched socket outlet	No	10		
	Carried forward					

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	Brought forward					
		.06 16A, 2P+E, IP67 Industrial switched interlocked socket	No	9		
		.07 16A, 2P+E, IP67 Industrial male adaptor	No	9		
AB.03.02	**403,02**	**Supply and Install isolators:**				
		.01 30A 2 pole in S15 type York box	No	1		
		.02 Switch Disconnector for 1.1kW Fan complete with, Emergency Stop Actuator FAK type in stainless steel IP65enclosure mounted on Stainless Steel Pedestal. Installed at Fan for Isolation purposes.	No	3		
	404,00	**FIXED APPLIANCE AND COMPONENTS**				
AB.03.06	**404,01**	**Replace connection from isolator to fixed appliance, with flexible copex (Sprague) conduit and conductors:**				
		.01 Fan : 2 x 4 mm² PVC and 2,5 mm² BCEW conductors.	No	3		
	405,00	**WIRE WAYS CONDUITS AND ACCESSORIES**				
AB.03.04	**405,01**	**Supply and Install conduit :**				
		.01 20mm PVC Surface Mounted or in ceiling void	m	200		
AB.03.11	**405,02**	**Supply and install outlet (draw) boxes :**				
		.01 100 x 50 PVC	No	6		
		.02 100 x 100 PVC	No	10		
		.03 50 x 100 mm white enamel extension box	No	1		
		.04 100 x 100 mm white enamel extension box	No	1		
		.06 Circular 20mm PVC	No	22		
Carried forward						

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
Brought forward						
AB.03.12	**405,03**	**Supply and install draw box cover plates (white enamel) to fit:**				
		.01 100 x 50 box	No	1		
		.02 100 x 100 box	No	1		
		.03 Circular PVC box	No	22		
AB.03.05	**405,04**	**Replace wiring channel:**				
		.01 OL 2000, 41.3 x 41.3 mm	m	6		
		.01 Light duty cable tray 50mm complete with unistrut brackets	m	18		
		.02 Medium duty cable tray 152mm complete with unistrut brackets	m	30		
	406,00	**EARTHING AND BONDING**				
AB.04.01	**406,01**	**Supply and install earthing and bonding of all electrical eqiupment and appliances**	Sum	1		
	407,00	**LIGHTNING PROTECTION**				
AB.04.03	**407,01**	**Supply and install earth electrodes:**				
		.01 16 mm dia. 1.2 m long Cu rod and clamp	No	8		
AB.04.04	**407,02**	**Provide cadweld joint on 50 mm² cable**	No	8		
AB.04.05	**407,03**	**Earth building roof structure**	No	3		
AB.04.02	**407,04**	**Testing of lightning earthing by a specialist contractor and provide earthing certificate**	Sum	1		
AB.03.21	**407,05**	**Provide Certificate of Compliance for the Installation as required on instruction from the Engineer**	No	3		
	408,00	**SITE ELECTRICAL**				
	408,01	**Excavate in all materials for trenches, backfill, compact and dispose of surplus material**	m^3	5		
Carried forward						

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
Brought forward						
	408,02	**Supply and install cable warning tape**	m	10		
	408,03	**Supply and install cable sleeves**				
		.01 50mm ø PMA PCL flexible plastic complete with bends	m	12		
	408,02	**Supply and delivery of PVC/SWA/PVC/ECC Cu low-voltage cable:**				
		.01 2.5 mm² 3 core	m	40		
		.02 1.5 mm² 3 core	m	30		
		.03 1.5 mm² 7 core	m	30		
	408,02	**Supply, delivery, install and terminate bare copper earth conductor**				
		.01 1.5 mm^2	m	40		
	408,04	**Lay PVC/SWA/PVC/ECC Cu LV cable:**				
		.01 2.5 mm² 3 core	m	40		
		.02 1.5 mm² 3 core	m	30		
		.03 1.5 mm² 7 core	m	30		
	408,05	**Termination sets of PVC/SWA/PVC Cu LV cable:**				
		.01 2.5 mm² 3 core	No	8		
		.02 1.5 mm² 3 core	No	6		
		.03 1.5 mm² 7 core	No	6		
TOTAL SCHEDULE NO 4: CARRIED TO SUMMARY						

Tender No. G506/2023

SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE

APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS PROCUREMENT DOCUMENT

SUMMARY OF SCHEDULES OF QUANTITIES

TOTAL SCHEDULE 1: PRELIMINARY AND GENERAL	R	.....
TOTAL SCHEDULE 2: CIVIL, STRUCTURAL AND BUILDING RELATED REPAIR WORK	R	.....
TOTAL SCHEDULE 3: MECHANICAL WORK	R	.....
TOTAL SCHEDULE 4: ELECTRICAL WORK	R	.....
SUB-TOTAL (A)	**R**	.....
CONTINGENCY ALLOWANCE	**R**	**160 000,00**
SUB-TOTAL (B) EXCL VAT	**R**	.....
VALUE-ADDED TAX (VAT) The tenderer shall add 15% of the subtotal for value-added tax	R	.....
TENDER SUM CARRIED TO FORM OF TENDER	R	.....

SIGNED ON BEHALF OF TENDERER: ……..

PART C: THE CONTRACT
Part C3: Scope of Work

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

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C3.2	Specifications	95
C3.3	Drawings	96

PART C: THE CONTRACT
Part C3: Scope of Work

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

C 3.1. Description of the Works

C3.1.1 Background

South African National Biodiversity Institute (SANBI) has been allocated finds by the Department of Forestry, Fisheries, and the Environment (DFFE) for the period 2022/23 – 2023/24 for the refurbishment, upgrade, repair, and maintenance of existing infrastructure, as well as the construction of new infrastructure. The infrastructure will address the needs of SANBI from an administrative, research, educational, and tourism perspective. Projects have been identified for implementation over the period at each of SANBI's existing campuses across the country.

This is particularly the case at the Lowveld National Botanical Garden (LNBG) which has received grants from DFFE as the current nursery infrastructure has deteriorated due to a lack of annual maintenance and does not meet the infrastructure demands for the garden to operate efficiently. As a result, SANBI requires the services of a team of professionals to renovate and refurbish nurseries at LNBG. The upgrades are fundamental operational infrastructure which will allow the garden to operate efficiently, resulting in the garden becoming more attractive to visitors.

In May of 2023, Virtual Consulting Engineers were appointed by SANBI for the assessment, design, procurement, construction, and monitoring for the refurbishment of nurseries at the Lowveld National Botanical Gardens.

C3.1.2 Scope of Works

The purpose of this contract is aimed at addressing deferred maintenance and compliance issues related to the infrastructure. Repair or replacement items as listed below are included for the work that is required outside the normal day-to-day maintenance activities.

C3.1.2.1 Glass House

Civil, Structural and Building Works

- Glass House overhead netting structure that is currently damaged to be repaired. The torn net must be replaced.
- Rubber seals not sealing the glass house properly must be replaced.
- Glass House glass previously stained must be cleaned and de-stained.
- Glass House glass out of position must be fixed.
- Glass cracked and broken must be replaced.
- Trees affecting glass house must be trimmed.
- Glass House frame nuts that are rusted must be replaced.
- Pores seen on concrete must be sealed.
- Concrete floors that are cracked must be repaired.

- Glass House doors must be fixed to ensure that the doors close properly, glass on doors must be replaced, new handles fitted, and lock mechanism replaced to a working condition.
- Sump covers must be fitted and secured properly to ensure a complete seal.
- Glass House floors must be cleaned to remove algae, levelled, cracks repaired, and correct slopes must be instituted.
- Plant beds concrete damage must be repaired.

Mechanical Installations

- Irrigation piping which are rusted and leaking must be replaced. Solenoids for controlling irrigation must be replaced and optimised.
- Irrigation system that led to water ingress in luminaires must be revamped. Sprinklers must be installed where missing.
- Old irrigation piping that is rusted and blocked outside of the Glass House must be removed.
- Irrigation piping arrangement from outside to inside of the Glass House to be revised.
- Leak at piping at the inlet of the irrigation booster pump, situated outside the Glass House, must be repaired.
- The dysfunctional irrigation booster pump situated outside the Glass House must be replaced.
- Evaporative cooling pad frame that had excessive rust must be replaced when new evaporative cooling pads or alternative mist system is installed.
- Sheeting installed at place of evaporative cooling pads must be removed. New structure must be fitted at part of installing new evaporative cooling pads or alternative mist system.
- New evaporative cooling pads or alternative mist system and air inlet louvres for winter seasons must be installed.
- Plant beds must be fitted with new soil heaters complete with temperature sensors and controllers.
- Instrumentation and wiring that were removed or incomplete for sump pump must be reinstated.
- Sump that was overflowing must be fitted with level probes and an overflow pipe to irrigate surrounding grass must be installed.
- Sump piping that is dysfunctional must be replaced when new evaporative cooling pads are installed.
- Fan motors that are excessively rusted and don't function must be replaced when new fan assemblies.
- Fans that are dysfunctional with old motors, pulleys taken out, and frames and fan blades rusted must be replaced.
- Fan machine guards that were previously disassembled must be reinstated as part of fitting new fan assemblies.
- Glass House fan louvres surface rust must be removed.

Electrical Installations

- Old Glass House electrical panel must be replaced with modern and optimised panel.
- Electrical wiring and conducts that are rusted, damaged, and unsafe inside the Glass House must be replaced.
- Glass House lamination/ luminaires filled with water must be replaced with waterproof (IP65) light fittings to improve safety.

- Electrical cables and e-stops related to fans must be replaced to ensure the safe operation of mechanical and electrical installations.

C3.1.2.2 Germination House

Civil, Structural and Building Works

- The Germination House roof sheeting must be replaced including trusses and purlins which are broken or previously nailed to the old roof sheeting.
- Concrete around Germination House that previously collapsed must be repaired.

Mechanical Installations

- Valves at the Germination House must be repaired, serviced, and returned to operation where possible. Otherwise, new valves must be installed where repairs and servicing are not possible.
- Germination House piping to be replaced where rusted.
- Solenoid valve, pressure gauge and filters must be replaced.
- Soil heaters that were dysfunctional and not working must be replaced.
- Soil heater isolator, controls and temperature regulator that do not work must be replaced.
- A new irrigation booster pump complete with securing brackets must be installed near the Mist House.

Electrical Installations

- Soil heater conduits that are rusted, and enclosing unsafe wiring must be replaced completly with new cables.
- Cables going to soil heater isolators, controls and temperature regulators must be repaired or replaced, depending on their condition.

C3.1.2.3 Mist House

Civil, Structural and Building Works

- The damaged and not fit for purpose roof sheeting must be replaced at the Mist House.
- After the refurbishment of the Mist House, appropriate housekeeping will be conducted by the contractor.
- Concrete cracked inside the Mist House must be repaired.

Mechanical Installations

- Mist House water controls and filters must be reinstated.
- Mist House soil heaters, controls, and temperature regulators must be replaced.
- Mist House pipes that are currently rusted must be replaced. Where possible, alternative piping materials which are corrosion resistant must be utilised.

Electrical Installations

- Mist House electricity panels that are not safe, rusted and filled with wasps must be upgraded and modernised.
- Mist House panel controls that not functional must be replaced. This will include cables and conduits to and from soil heaters.

PART C: THE CONTRACT

Part C3: Scope of Work

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

C3.2. Specifications

TECHNICAL SPECIFICATION

AA PLUMBING AND DRAINAGE INSTALLATIONS

CONTENTS

AA 01 SCOPE
AA 02 STANDARD SPECIFICATIONS
AA 03 VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS
AA 04 OPERATING AND MAINTENANCE MANUALS
AA 05 TESTS AND INSPECTIONS ON COMPLETION OF MAINTENANCE WORK
AA 06 QUALITY ASSURANCE SYSTEM
AA 07 OPERATING AND COMMISSIONING OF PLANT AND INSTALLATION
AA 08 GUARANTEE OF INSTALLATION AND EQUIPMENT
AA 09 MAINTENANCE WORK TO INSTALLATIONS, SYSTEMS AND EQUIPMENT
AA 10 MAINTENANCE TO INSTALLATIONS, SYSTEMS AND EQUIPMENT

AA 01 SCOPE

This specification covers the general maintenance and servicing of plumbing and drainage installations, which include the following:

(a) Rainwater disposal systems
(b) Soil and wastewater drainage systems
(c) Domestic water distribution and reticulation systems
(d) Sanitary and brassware equipment
(e) Fire water piped reticulation networks.

This specification shall form an integral part of the maintenance and servicing contract document, and shall be read in conjunction with the additional and particular specifications compiled as part of this document.

This specification shall act as a guideline to the Particular Specification and, in the event of any discrepancies between the Technical Specification and the Particular Specification, the latter shall take precedence.

AA 02 STANDARD SPECIFICATIONS

AA 02.01 GENERAL STANDARD SPECIFICATIONS, REGULATIONS AND CODES

The latest edition, including all amendments up to date of tender, of the following specifications, publications and codes of practice shall be read in conjunction with this specification and shall be deemed to form part thereof:

AA 02.01.01 SANS Specifications and codes

SANS 10400 - The application of the National Building Regulations
SANS 1200 DB - Earthworks (pipe trenches)
SANS 1200 LB - Bedding (pipes)
SANS 1200 - Medium-pressure pipelines
SANS 1200 LD - Sewers
SANS 10252. Part 1 - Water supply installations for buildings
SANS 10252. Part 2 - Drainage installations for buildings
SANS Specifications listed on page 3 of the DPW Specification OW 371

AA 02.01.02 Department of Public Works Specifications

OW 371 - Specification of materials and methods to be used. (Fourth revision, October 1993)
Guide for architects concerning drainage, water supply and stormwater drainage
PW 343 - Building specifications for regional offices
FPO/G61/3E - Guide to architects
Drainage details.

AA 02.01.03 Occupational Health and Safety Act

The Contractor shall be required to comply with the Occupational Health and Safety Act 85 of 1993, Construction Regulations 2014 and related regulations. Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

AA 02.01.04 Manufacturers' specifications, codes of practice and installation instructions

All equipment and materials shall be installed, serviced and repaired strictly in accordance with the manufacturers' specifications, instructions and codes of practice.

AA 02.01.05 Municipal regulations, laws and by-laws

All municipal regulations, laws, by-laws and special requirements of the Local Authority shall be adhered to unless otherwise specified.

AA 03 VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS

The following additional general specifications and requirements shall be read in conjunction with this specification and shall be adhered to unless otherwise specified in the Particular Specification.

AA 03.01 GENERAL REPAIR AND INSTALLATION REQUIREMENTS

(a) All materials and equipment supplied and installed shall be new, high quality and designed and manufactured to the relevant specifications and suitable for providing efficient, reliable and trouble-free service.

(b) All work shall be executed in a first-class workman-like manner by qualified registered plumbers.

(c) All equipment, component parts, fittings and materials supplied and/or installed, shall conform in respect of quality, manufacture, test and performance to the requirements of the applicable current SANS specifications and codes, except where otherwise specified or approved by the Engineer in writing.

(d) All materials and workmanship which, in the opinion of the Engineer, are inferior to that specified for the work will be condemned. All condemned material and workmanship shall be replaced or rectified as directed and approved by the Engineer.

(e) The Contractor shall submit a detailed list of the equipment and material to be used to the Engineer for approval before placing orders or commencing installation.

(f) All new piping shall be installed and positioned such as to not impede on access routes, entrances and other services. The Contractor shall coordinate these new pipe routes taking other services and equipment into account.

(g) All control equipment and serviceable items shall be installed and positioned such that they will be easily accessible and maintainable.

(h) The Contractor shall make sure that all safety regulations and measures are applied and enforced during the repair and maintenance work to ensure the safety of the public and the User Client.

(i) Repair and maintenance work shall be programmed in such a manner as to ensure the shortest possible downtime of any service and the least inconvenience to the User Client and the public. The Contractor shall make sure that the necessary notifications and notices are timeously put into place for these activities.

AA 03.02 GENERAL REQUIREMENTS FOR REPAIR AND INSTALLATION OF DOMESTIC WATER INSTALLATIONS

(a) All pipes are to be carefully examined for defects and flaws before installation and shall be neatly fitted. They shall be installed in such manner as to prevent the formation of air locks. Automatic air vents shall be installed on all high points of the installation.

(b) The ends of all the pipes are to be cleaned, free from burrs, and rough edges, and joined together tightly. Where applicable, an approved pipe joint compound may be sparingly used with best quality hemp. All surplus or exposed hemp is to be thoroughly cleaned off joints before the painting of pipes.

(c) All vertical pipes must be securely fixed with brackets and supports of approved type, fixed securely into the wall and not more than 40 mm from the wall. These fixings must be strictly adhered to.

(d) Pipes installed in service ducts and ceiling voids are to be perfectly plumbed and secured with approved brackets, fixed securely at distances not exceeding the specified distances and not more than 40 mm away from the face of the walls or soffits. Pipes inside buildings and where specified shall be chased into walls, wrapped with building paper and properly secured and covered. Pipes must be free to move in the brackets.

(e) Pipes passing through the walls and concrete floors are to be provided with suitable pipe sleeves extending 10 mm beyond finished floor or wall surfaces. All pipe fixings and throughways shall be free to allow movement for expansion and contraction. Any pipe fitting feeding a pipe which is rigidly secured by a structural element shall be securely anchored to prevent any stress developing between the fitting and the structural element.

(f) Chromium or nickel-plated metal covering plates are to be provided and fixed securely to pipes passing through the ceilings and walls. This requirement is not applicable to concrete floors and ceilings.

(g) Pipes passing through the ceilings or floors shall be offset from the wall to the front of the cornice with sufficient clearance to allow for the clear fixing of a ceiling plate. Pipes installed directly through the cornice will not be allowed. In multi-storey buildings where wall thickness varies, the same shall apply.

(h) All offsets are to be evenly and symmetrically set, the offsets being as high and as near the ceiling as possible.

(i) Pipes shall be installed in such a manner to allow for contraction and expansion.

(j) During construction all pipe ends shall be kept plugged to prevent any ingress of dirt, rubble, etc.

(k) Damages, chases, holes, etc, in brickwork, concrete and other finishes resulting from repair, replacement and service work shall be made good to match the existing and shall include plaster, concrete work, brickwork, paint, tiling, ceilings and all required materials for the remedial action.

(l) The work shall be of a high quality and executed by qualified tradesmen in accordance with the relevant specifications.

AA 03.03 GENERAL REQUIREMENTS FOR REPAIR AND INSTALLATION OF SOIL AND WASTEWATER INSTALLATIONS

The following requirements shall apply to this installation unless otherwise specified.

AA 03.03.01 Underground sanitary drainage installations

(a) All manhole covers and frames shall be cast into the concrete cover slabs.

(b) Manholes in trafficable areas shall be provided with type 1A heavy-duty cover and frame and surrounded by concrete slabs.

(c) Fittings in the ground and below floor slabs shall be without access eyes.

(d) Sewer pipes in the ground with a slope steeper than 1:5 and under surface beds shall be encased in concrete as detailed.

(e) The sewer outside the boundary of the building complex shall be constructed strictly in accordance with the details and specifications of the local authorities.

(f) Existing drainage invert levels and positions are to be checked against invert levels given on the drawings before commencing the work. The Contractor shall inform the Engineer immediately of any discrepancy.

(g) All existing services are to be located and opened before commencing the proposed drainage work.

(h) The drainage system shall be tested according to the specifications laid down by the NBRI. This shall be carried out in the presence and to the satisfaction and approval of the Engineer.

(i) During construction all pipe ends are to be suitably plugged to prevent any ingress of dirt, rubble, etc.

(j) Modern technology video surveying equipment and detection equipment shall be utilised to establish blockage problems and indicate the positions of such problems.

(k) Any drainage pipe within the 45° range below building foundations shall be encased in concrete or soilcrete as specified.

AA 03.03.02 Above ground sanitary drainage installations

(a) All accessible waste and soil fittings above ground level shall have inspection eyes. Inspection eyes shall not be underneath any fittings.

(b) All single wash hand basins shall be connected to a 40 mm internal diameter waste pipe.

(c) All groups of wash hand basins and sinks shall be connected to a 50 mm internal diameter waste pipe, unless otherwise indicated.

(d) All traps up to and including 50 mm diameter shall be of the "deep reseal" (75 mm) type.

(e) The maximum bend on any single fitting shall be 45°, with the exception of ventilation pipes where bends of up to 90° may be used.

(f) Drainage pipes and fittings running below concrete slabs and along walls and columns shall be suspended by means of approved type hangers, holderbats, etc, and at appropriate intervals, to provide a rigid, proper suspended system and as required by the manufacturer.

(g) All ventilation pipes shall be finished off with a suitable durable grating.

(h) All S-trap WC pans shall have plugged anti-siphon horns fitted to provide for cleaning access.

AA 03.04 PRESSURE TESTING OF PIPES

(a) All new pipe installations under the repair Contract shall be pressure tested before being taken into use. The Engineer shall witness this pressure test.

(b) Completed sections of the pipe installation shall be filled with water after all branches have been plugged, sealed or closed.

(c) The section of pipe shall be hydraulically pressure tested by means of a suitable manually operated or mechanically driven pressure pump.

(d) A pressure of at least 1,5 times the working pressure of the class rating of pipes or fittings shall be applied for a period of time specified in the specifications or as recommended by the manufacturers. (Refer to SANS 1200 L for minimum and maximum test pressures.)

(e) Tests shall not be performed against closed valves.

(f) Leakage which occurs shall be measured and calculated and checked against the allowable losses, as specified in SANS 1200 L.

(g) If the completed section of pipe complies with all specifications and passes the tests and inspection, it can be approved by the Engineer and the Contractor instructed to backfill the open sections of trench at the joints and connections, where applicable.

(h) The Contractor shall then proceed to build all the valve chambers, inspection chambers, etc, for underground installations and close off pipes in walls, voids and ducts for above ground installations.

AA 03.05 STERILISING OF WATER PIPES

(a) Before any repaired and new pipeline is taken into use, the pipeline shall be sterilised over its complete length, including the fittings. The pipe shall be filled with potable water chlorinated to a concentration of 15 mg of chlorine per litre of water, which shall remain in contact with the inner surface of the pipeline for a period of not less than 24 hours. The pipeline shall be filled for sterilising in such a manner that no chlorine shock is created or air is trapped in the pipeline.

(b) The Contractor shall submit full details of the proposed method of sterilising the pipeline to the Engineer for approval at least fourteen days prior to the commencement of sterilising.

(c) The cost of water for filling the pipeline for sterilising shall be borne by the Contractor.

(d) The Contractor shall provide all necessary materials, tools, equipment and labour required for sterilising the pipeline. After sterilising the pipeline the Contractor shall, at no extra cost, empty the pipeline and dispose of the water in a manner approved by the Engineer.

The Contractor may use the following products as a source of chlorine:

- chloride of lime to SANS 295 yielding 33 % free chlorine by mass;
- calcium hypochlorite to SANS 295 yielding 70 % free chlorine by mass;
- chlorine gas applied by chlorinator.

After sterilisation, an approved water quality test shall be carried out to a minimum number of 10 % of the total water points, randomly selected, evenly spread and marked on drawings. These tests shall include a full bacteriological test as per SANS 241 and the results shall be submitted to the Engineer for approval. Each abortive test shall be for the Contractor's account.

AA 03.05.01 Bacteriological requirements

When tested the water shall comply with the limits given in table AA 03.05.01/1.

TABLE AA 03.05.01/1

PROPERTY	RECOMMENDED MAXIMUM LIMIT	MAXIMUM ALLOWABLE LIMIT
Total coliform bacteria count per 100 millilitre	Nil*	5
Faecal coliform bacteria count per 100 millilitre	Nil	Nil
Standard plate count per millilitre	100	Not specified

*(a) If any coliform bacteria are found in a sample, a second sample must be taken immediately after the tests on the first sample have been completed. This sample shall be free from coliform bacteria.

(b) Not more than 5 % of the total number of water samples (from any one reticulation system) tested per year may contain coliform bacteria.

The Engineer shall witness the sterilising of the pipes.

The Contractor shall ensure that during the sterilising procedure the necessary safety precautions are instituted to prevent the intake of water by the user and/or public from the system. On completion the system shall be properly flushed out.

AA 03.06 AIR TEST FOR SEWER AND DRAINS

The following air test requirements as specified in the NBRI information sheet X/BOU 2-34 shall be applicable to all air tests on new sewers and drains installed under the repair work phase, and shall be executed by the Contractor and witnessed by the Engineer.

AA 03.06.01 Method of air testing

All openings in the pipeline are plugged by means of sewer testing plugs. The sewer plug at the lowest end of the pipeline is connected to an air supply hose, which is attached to a mechanically driven air blower, compressor or hand pump. Air is pumped into the pipeline at a pressure of approximately 375 mm water gauge. The pressure is held at this level for a period of two minutes to allow the air temperature to become constant. Subsequently the air supply is closed off and the time recorded for the air pressure to drop from 250 to 125 mm water gauge. If the recorded time is less than the value given in table AA 03.06.01/1 below, it means that the pipeline leaks and does not comply with the required standards of tightness. The apparatus required for the air test is commercially available.

The following requirements have to be taken into account when performing the air test:

(a) Air-permeable pipelines such as vitrified clay or asbestos cement should preferably be tested when moist or wet.

(b) The trench should be partially backfilled before the test is carried out. This is to stop possible temperature variations and to prevent damage to the pipeline during subsequent backfilling operations.

(c) The testing equipment should be shielded from the direct rays of the sun.

(d) Flexible joints are recommended for sewer and drain pipelines. Good quality flexible joints are superior to cement caulked joints and they also provide the pipeline with flexibility to prevent cracking due to subsequent soil movement.

(e) The test method is very sensitive to flaws in the pipeline, such as cracks or leaking joints. The actual positions of flaws along the pipeline can be determined by using the special equipment.

(f) If the pipeline is below the water table and subjected to external water pressure, the test method should be modified so that the final pressure value is higher than that of the external water pressure acting on the lowest part of the installation.

TABLE AA 03.06.01/1: MINIMUM TIMES FOR PRESSURE DROP OF 250 mm TO 125 mm WATER GAUGE

PIPE (DIAMETER (mm)	MINIMUM TIME (min - s)	CRITICAL LENGTH OF PIPELINE (m) (58 m^2 INTERNAL SURFACE AREA)	MINIMUM TIME (S) FOR LONGER LENGTH (L) OF PIPELINE
100	1 - 58	184,6	0,640 L
150	2 - 57	123,1	1,439 L
200	3 - 56	92,3	2,559 L
225	4 - 26	82,1	3,239 L
250	4 - 55	73,8	3,998 L
300	5 - 54	61,5	5,757 L
375	7 - 23	49,2	8,996 L
450	8 - 51	41,0	12,954 L
525	10 - 20	35,2	17,632 L
600	11 - 49	30,8	23,030 L

AA 04 OPERATING AND MAINTENANCE MANUALS

The Contractor shall be responsible for the compilation of an inventory list and operating and maintenance manuals.

This shall be done in accordance with Additional Specification SB: Operating and Maintenance manuals.

All information shall be recorded and captured in electronic format as well as supplying the Department with three sets of hard copies.

AA 05 TESTS AND INSPECTIONS ON COMPLETION OF CORRECTIVE MAINTENANCE WORK

Except where otherwise provided in the Contract, the Contractor shall provide all labour, materials, power, fuel, accessories and properly calibrated and certified instruments necessary for carrying out such tests. The Contractor shall make arrangements for such tests and he shall give at least 72 hours notice to the Engineer, in writing, prior to commencing test.

In the event of the plant or installation not passing the test, the Employer shall be at liberty to deduct from the Contract price all reasonable expenses incurred by the Employer or the Engineer attending the repeated test.

Whenever any installation or equipment is to be operated for testing or adjusting as provided for above, the Contractor shall operate the entire system for as long a period as may be required to prove satisfactory performance at all times in the occupied space served by that system for up to twenty-four hours a day continuously until the system is handed over.

The Contractor shall provide all labour and supervision required for such operation and the Department may assign operating personnel as observers, but such observation time shall not be counted as instruction time.

After completing the installation or system, all equipment shall be tested, adjusted and readjusted until it operates to the satisfaction and approval of the Engineer.

The Contractor shall submit certificates of tests carried out to prove the performance of all equipment and also certificates to be obtained from all relevant authorities and statutory bodies, etc.

AA 06 QUALITY ASSURANCE SYSTEM

The Contractor shall institute an approved quality assurance (QA) system which shall be submitted to the Engineer for approval. The records of this QA system shall be kept throughout the duration of the Contract and be submitted to the Engineer at regular intervals as required.

AA 07 OPERATING AND COMMISSIONING OF PLANT AND INSTALLATION

On completion of the repair work and/or the installation of new systems the plant and equipment shall be put into operation after all tests and adjustments have been carried out to the satisfaction of the Engineer. The Contractor shall run and operate the system for a period of time as specified by the Engineer and train the staff of the User Client to operate and maintain the system. This period of time shall not exceed one month.

Logging of the operation of the installations shall commence immediately upon start-up.

The Contractor shall submit a full commissioning report.

AA 08 GUARANTEE OF INSTALLATION AND EQUIPMENT

The Contractor shall provide and obtain guarantees from the manufacturer(s) and/or supplier(s) to the effect that each piece of new equipment, supplied and installed under the repair contract, shall comply with the required performance and will function as part of the complete system.

All new equipment, including the complete new installations and the systems as a whole shall be guaranteed for a period of 12 (twelve) months commencing on the day of issue of a certificate of completion for repair work of the installation.

AA 09 CORRECTIVE MAINTENANCE WORK TO INSTALLATIONS, SYSTEMS AND EQUIPMENT

AA 09.01 GENERAL

During the maintenance and servicing Contract all the systems, installations and equipment shall be repaired as specified in the Particular Specification. This corrective maintenance work shall include but not be limited to the specified Particular Specification details.

All corrective maintenance work shall be executed using approved materials and equipment suitable to the systems and/or installations they serve.

All materials and equipment shall comply fully with the requirements as specified for each installation.

The said repair work shall be executed in accordance with the relevant codes of practice, standards, regulations, municipal laws and by-laws, manufacturer's specifications and codes of practice and all additional and particular specifications included in this document.

The repair work items shall be listed in tabular form in the Particular Specification with all relevant details, such as capacity, size, manufacturer, model number, etc.
All repair work shall be executed within the specified durations listed in the Appendix to Tender. All new equipment, materials and systems shall be furnished with a written guarantee with a defects liability period of 12 months from date of issue of a certificate of completion for the repair work. These guarantees shall be furnished in favour of the Department of Public Works. On completion of the required and specified repair work the systems, installations and equipment shall be commissioned and handed over to the satisfaction of the Engineer.

Repair work items for the plumbing and drainage installations shall be categorised under the following headings:

(a) Rainwater disposal systems
(b) Soil and wastewater drainage systems
(c) Domestic water distribution and reticulation networks
(d) Sanitary and brassware equipment
(e) Fire water piped reticulation networks.

AA 09.02 RAINWATER DISPOSAL SYSTEMS

AA 09.02.01 General

Repair work to the rainwater disposal system shall be detailed in the Particular Specification and shall include but not be limited to the following:

(a) Replacement of damaged, broken, leaking, corroded pipework and fittings;

(b) Replacement of damaged, broken and missing rainwater outlets, stormwater catch pit gratings, manhole covers and frames and floor drains;

(c) Repair work to damaged manholes, catch pits, kerb inlets, channel drains and drain points including builder’s work and benching;

(d) Initial unblocking and clearing of all rainwater drainage pipes, manholes, catch pits, drain points, channel drains and gutters;

(e) Repair and upgrading of drainage system where necessary;

(f) Provision of additional rainwater drainage points where outlets are insufficient and ponding occurs;

(g) Prevention of any unauthorised effluent into this drainage system;

(h) Reinstatement and making good of walls, tiling, floors, concrete, road surfaces, etc, to approved acceptable levels where any repair, upgrade and/or service work have been executed;

(i) Realign and fix gutters to correct falls where necessary, including additional brackets where required.

AA 09.02.02 Material and equipment specification for rainwater disposal systems

Materials and equipment to be used for repair items shall be suitable and/or adaptable to the existing installation and shall comply with the following:

(a) Vitrified clay pipe and fittings

Vitrified clay pipes shall only be used for underground installations. The pipes and fitting shall strictly conform to SANS 559. The pipes and fittings shall have a minimum crushing strength of 45 kN/m.

The joining method to be used shall be polypropylene couplings with integral rubber seal similar or equal to Vitrosleeve in accordance with SANS 974 allowing up to 2,5° angular movement per joint and 5 mm line displacement per joint. The joint shall retain an effective water seal with regard to above conditions with a 6 m water head.

Pipes shall be cut using an approved pipe cutter and the ends shall then be trimmed by means of a pipe trimmer to remove any sharp edges.

The piping system shall be tested as indicated in this specification.

(b) Supercast cast-iron pipe and fittings

Supercast cast-iron pipes can be used for underground and above ground installations. Plain-ended cast-iron pipes and fittings, manufactured from 150, grade A grey iron in accordance with SANS 1034 shall be used. Fittings and pipes shall be free of pinholes, blowholes, blemishes, flash and foundry sand and have a smooth bore. All pipes and fittings shall be sand-blasted and coated on the inside and outside by submersion in a corrosion inhibiting oxide primer or bitumen paint.

The pipes and fittings shall be joined by means of stainless steel neoprene couplings as supplied by the manufacturer of the pipe system. The coupling shall be installed according to the manufacturer's specification and tightened with a torque wrench to a torque of 6,8 Nm.

(c) uPVC pipe and fittings above ground

uPVC pipes and fittings can be used for above ground installations.

For pipe sizes larger than 160 mm diameter uPVC class 6 pressure pipe to SANS 966 shall be used with prefabricated uPVC bends and junctions. Prefabrication shall be done by means of hot-air welding of fittings to be covered with three layers of fibreglass reinforced lining over welded sections. The resin to be used shall be as specified by the manufacturer for usage with PVC. Bends shall be manufactured out of 3 to 4 sections per bend. Pipe joints shall be done by means of couplings fixed with solvent cement for PVC piping. This joint shall be reinforced with a fibreglass lining of three layers.

Piping has to be supported and bracketed with properly sized and designed brackets consisting of two half sections clamped over the pipe and hanged with two hanger rods.

Pipes to be pressure tested in sections as specified in this specification.

(d) Prefabricated galvanized steel piping and fittings above ground

Prefabricated galvanized steel piping can be used for above ground rainwater drainage systems. The pipe to be used shall be plain ended medium gauge uncoated pipe to SANS 62 galvanized to SANS 763. All fittings are to be manufactured from the same material welded with flanged ends or rolled ends to fit clambon fittings. Fittings are only to be galvanized after manufacturing. All joints to be either flanged or equipped with clambon couplings. All fittings and junction to be 45° sections.

The pipe system shall be properly secured and bracketed at regular intervals with correctly sized and designed galvanized brackets.

Pipes are to be pressure tested in sections as specified in this specification.

(e) Geberit HDPe pipe and fittings

Geberit HDPe pipes and fittings can be used for underground and above ground installations where specified. Pipes shall be plain ended and only Geberit HDPe bends and fittings shall be used. Jointing of pipes and fittings shall be done by butt welding, electro-sleeve couplings and/or flanged joints. Pipes and fittings shall only be installed by Geberit approved installers and the Contractor shall furnish a certificate to this effect. Pipes and fittings shall be installed strictly according to the Geberit application technique.

Pipes to be pressure tested in sections as specified in this specification.

(f) Roof outlets

Where waterproofing is installed, as for roof slabs, an adjustable roof outlet/drainage point to be used consisting of a cast-iron unit with cast-iron ring clamp to fit over waterproofing edge and an adjustable height outlet to fit in with the screed level. For surfaces such as paving and walkways a flat grating of brass or cast iron shall be used with a catch basket. Within paving blocks a square top frame shall be used. For roof outlets a domed grating is to be used. Where roofs are to be covered with stones, a mesh shall be installed to prevent any stones from entering the rainwater system.

Two-way side outlets shall be used in cases where required.

Floor and roof outlets to be fitted to cast-iron pipe by means of SSN couplings.

AA 09.03 SOIL AND WASTEWATER DRAINAGE SYSTEM

AA 09.03.01 General

Repair work to the soil and wastewater drainage system shall be detailed in the Particular Specification and shall include but not be limited to the following:

(a) Replacement of damaged, broken, leaking, corroded above and underground pipework and fittings;

(b) Replacement of damaged, broken and missing gully gratings, manhole covers and frames, cleaning eye covers, screws and bolts, inspection eye covers, end caps and vent cowls;

(c) Repair work to damaged manholes, gullies, cleaning eyes, floor drains, etc, including builder’s work and benching;

(d) Initial unblocking and cleaning of all drainage pipework, traps, floor drains, gullies and sanitary ware equipment;

(e) Video surveying of all underground drainage pipework to establish root ingress, damaged pipework, fat build-up, blockages, incorrect falls, sagging and as-built information. This survey shall be utilised to establish the extent of repair and upgrade work to be executed;

(f) Repair and upgrading of soil and wastewater drainage systems where necessary;

(g) Repair work to bracketing systems including fixing and repair of existing brackets and the introduction of additional brackets where required;

(h) Repair, re-fix and bracket sanitary ware equipment to walls, floors, etc, where required;

(i) Repair, replace and clean out sanitary ware and equipment traps;

(j) Test pipe system, traps and equipment for leakage;

(k) Empty, clean out separators, clean out strainers, and test for leak tightness, repair and recommission oil and grease separators. Check the conformance of the capacities of the oil and grease separators in relation to the facilities they serve; where necessary these shall be upgraded and where no separators have been provided, new separators shall be provided;

(l) Reinstatement of walls, tiling, floors, concrete finishes, holes, chases, surfaces, etc, to an approved acceptable level where any repair, upgrade and/or service work have been executed;

(m) Prepare, paint and repaint pipework and equipment where necessary, in accordance with Technical Specification BH: Fittings.

AA 09.03.02 Material and equipment specification for soil and wastewater drainage systems

Materials and equipment to be used for repair items shall be suitable and/or adaptable to the existing installation and shall comply with the following:

(a) Vitrified clay pipe and fittings

Vitrified clay pipes shall only be used for underground installations. The pipes and fittings shall strictly conform to SANS 559. The pipes and fittings shall have a minimum crushing strength of 45 kN/m.

The jointing method to be used shall be polypropylene couplings with integral rubber seal similar or equal to Vitrosleeve according to SANS 974 allowing up to 2,5 ° angular movement per joint and 5 mm line displacement per joint. The joint shall retain an effective water seal with regard to the above conditions with a 6 meter water head.

Pipes shall be cut using an approved pipe cutter and the ends shall then be trimmed by means of a pipe trimmer to remove any sharp edges.

The installation shall be tested according to the NBRI information sheet X/BOU 2-34.

(b) Supercast cast-iron pipe and fittings

Supercast cast-iron pipes can be used for underground and above ground installations. Plain-ended spun cast-iron pipes and fittings manufactured from 150 grade A grey iron in accordance with SANS 1034 shall be used. Fittings and pipes shall be free of pinholes, blowholes, blemishes, flash and foundry sand and to have a smooth bore. All pipes and fittings are to be sand-blasted

and coated on the inside and outside by submersion in corrosion inhibited oxide primer or bitumen paint.

The pipes and fittings shall be joined by means of stainless steel neoprene couplings as supplied by the manufacturer of the pipe system. The coupling shall be installed according to the manufacturer's specification and be tightened with a torque wrench to a torque of 6,8 Nm.

Where cast-iron stub stack overflow gullies are used with pipe materials such as PVC a rubber O-ring shall be used to fit over the PVC pipe into the cast-iron fitting. The joint shall be grouted up afterwards.

Above ground piping shall be bracketed with properly sized and designed brackets according to the manufacturer's specification at correct intervals.

The piping system shall be tested in accordance with the NBRI information sheet X/BOU 2-34.

(c) uPVC soil and waste pipe and fittings

UPVC soil, vent and waste pipe systems can be used for underground and above ground drainage installations. This piping shall conform in all respects to SANS 971 for underground systems and to SANS 967 for above ground systems.

All underground pipes, as well as soil pipes above ground, shall be joined by means of rubber ring seal couplings and fittings in accordance with the manufacturer's specification. All waste and vent pipes shall be joined by means of solvent weld fittings and couplings. The solvent weld glue to be used shall be as specified by the pipe manufacturer, allowing for thermal contraction and expansion.

The piping system shall be pressure tested in accordance with the NBRI information sheet X/BOU 2-34.

(d) Structural wall uPVC pipes and fittings

Structural wall uPVC drainage pipe can be used for underground drainage systems. This piping system shall be used with standard underground uPVC pipe fittings, equipped with rubber ring joints. The pipe shall be equipped with z-lock type rubber ring joints.

The piping system shall be pressure tested in accordance with the NBRI information sheet X/BOU 2-34.

(e) Geberit HDPe pipes and fittings

Geberit HDPe pipes and fittings can be used for underground and above ground installations. Pipes shall be plain ended and only Geberit HDPe bends and fittings shall be used. Jointing of pipes and fittings shall be done by butt welding, electro-sleeve couplings and/or flanged joints. Pipes and fittings may only be installed by Geberit approved installers and the Contractor shall furnish a certificate to this effect. Pipes and fittings shall be installed strictly according to the Geberit application technique.

The complete system shall be pressure tested in accordance with the NBRI information sheet X/BOU 2-34.

(f) Stainless steel floor traps and floor channels

Stainless steel floor traps and channels shall be manufactured from 304 stainless steel with a load capacity of 1 500 kg. The floor traps shall have a flow capacity of 3 litre/second.

The units shall be fitted with a double water seal, large sludge box and shall be easily dismantleable for cleaning purposes. Tiling keys and waterproofing flanges shall be provided where required. Side inlets with diameter of 50 mm shall be provided for waste connections to other equipment where required.

(g) Cast-iron floor traps

Cast-iron floor traps shall be manufactured from cast iron and shall be fitted with a water seal and a large sludge box and lid to be easy removable for maintenance purposes. The unit shall be designed such as to provide access to the drainage system and to be used as a cleaning point.

AA 09.04 DOMESTIC WATER DISTRIBUTION AND RETICULATION NETWORKS

AA 09.04.01 General

Repair work to the domestic water distribution and reticulation networks shall be detailed in the Particular Specification and shall include, but not be limited to the following:

(a) Replacement of damaged, broken, leaking, corroded above and underground pipe work, fittings and equipment;

(b) Repair, replace and service valves, which shall include new gaskets, gland packings, seals, bolts and nuts, etc;

(c) Where valves do not close properly, all these valves shall be refurbished, descaled and replaced where necessary;

(d) Repair, clean and service all strainers, including the replacement of strainer elements where corroded and installation of new gaskets;

(e) Repair, service, test and readjust pressure-reducing valves. Pressure gauges are to be recalibrated and checked. Up and downstream pressures are to be logged. Downstream pressure has to be adjusted to an acceptable level, taking into account the allowable working pressure of the system and its components;

(f) Repair, service and check the proper functioning of all non-return valves;

(g) Repair, service, readjust and calibrate all safety and expansion relief valves;

(h) Repair, service and clean out all air release valves and vacuum breakers;

(i) Repair work to bracketing systems including fixing and repair of existing brackets and provision of additional brackets where required;

(j) Hot-water pipe lagging and cladding shall be inspected, repaired, sealed and replaced where required;

(k) Repair, service and log readings of water meters including cleaning of integral strainers;

(l) Water storage tanks are to be emptied, cleaned out, repaired, sealed and put back into operation. Ball float and/or filling valves to these tanks are to be serviced and repaired where required;

(m) Water pipes are to be sampled for corrosion and scaling. The Engineer will evaluate the actions to be taken if the results of this sampling indicate that attention is required;

(n) Water supply has to be sampled and chemically analysed for the suitability to the systems and materials it serves;

(o) Domestic geysers are to be repaired and serviced in accordance with the manufacturer's specification and shall include descaling, replacement of elements, testing for any leaks, checking of safety valve operation (replace if required), testing of the thermostat operation and set point (replace if necessary);

(p) Pressure test and sterilise repaired new installation and equipment;

(q) Reinstatement and making good of walls, tiling, floors, concrete, finishes, holes, chases, surfaces, etc, to an acceptable level where repair, upgrade and/or service work have been executed.

AA 09.04.02 Material and equipment specification for domestic water distribution and reticulation networks

Materials and equipment to be used for repair items shall be suitable and/or adaptable to the existing installation and shall comply with the following requirements:

(a) Copper pipe installation

(i) The installation of copper piping systems shall be done in accordance with the manufacturer's code of practice and all relevant codes, standards and regulations.

(ii) Copper pipes shall only be installed downstream of galvanized mild steel pipes when applicable.

(iii) Where dissimilar metals are joined, dielectric or isolating couplings shall be used. This is not required where copper and brass dezincified alloys join.

(iv) Copper pipes shall be of the hard drawn type Class 0 in accordance with SANS 460 and shall be joined by means of capillary soldered type fittings. No compression type fittings shall be allowed unless otherwise specified.

(v) Copper capillary soldered type fittings shall be used in accordance with ISO 2016, SANS 1067, DIN 2856 or BSS 864.

(vi) The soldering flux to be used shall be water based and easily flushed out, withstand temperatures above 240 °C and shall contain no ammonia. The flux shall be non-toxic when dissolved in water.

(vii) The solder to be used shall be in accordance with SANS 24 and shall consist of a material containing 97 % tin and 3 % copper. Solders containing lead, resin core and acid core shall not be used.

(viii) The heat source to be used shall be propane gas with induction air, at a temperature not higher than 240 °C. The pipe ends and fittings shall be cleaned and waxed with an approved solder flux, before soldering.

The pipe and fittings shall then be fitted together and heated to the correct temperature before the solder is applied. Care must be taken not to add too much or too little solder to the joint. Immediately after setting of the solder the joint shall be wiped clean with a wet cloth. Pipes shall be washed out as soon as possible after jointing and all traces of flux shall be removed.

(ix) All bronze or brass equipment and fittings shall be of the dezincified type.

(x) Copper pipes and fitting shall be installed strictly to the manufacturer's specification and include the following:

(1) No labour bends;

(2) Provision for thermal contraction and expansion of pipes;

(3) Pipe brackets shall be installed at appropriate positions where pipes are installed on surface level;

(4) Pipes chased or built into walls or floors shall be wrapped with two layers of building paper or similar approved material. Hot and cold water pipes running next to each other shall be at least 50 mm apart;

(5) Equipment fixed to copper pipe outlets, where the pipes are surface mounted or built into walls, shall be done by means of copper wall plate fittings on the copper pipes, properly secured to the structure to prevent structural damage to soldered joints.

(xi) Pipe hangers and brackets shall be of copper, copper alloy or non-conductive materials. No piece of copper pipe shall touch any other conductive surface. Brackets shall be designed to structurally support and fix the pipe system, and shall allow enough clearance from walls, soffits, etc, to insulate hot-water pipes and maintain equipment.

(xii) Pipe hangers and brackets shall be installed according to the manufacturer's specification on the following maximum spacings:

PIPE DIAMETER (mm)	HORIZONTAL (metre)	VERTICAL (metre)
15	1,3	1,9
22 and 28	1,9	2,5
35 and 42	2,5	2,8
54	2,5	3,9
67 – 108	2,8	3,9

(xiii) All copper pipes open to structural damage, shall be protected by steel sleeves or structurally designed cover.

(xiv) All pipework shall be pressure tested and sterilised as specified.

(xv) Where flanged fittings are used, cadmium-plated bolts, nuts and spring washer shall be used to joint these flanges.

(xvi) All hot-water pipes shall be lagged as specified.

(xvii) Shut-off valves shall be installed on all branch pipes and ball-o-stop valves shall be installed on all connectors to basin pillar cocks, sink mixers, cistern type WCs and other fittings.

(xviii) All types shall be marked in accordance with SANS 10140 or as specified by the Engineer.

(xix) Approved type expansion bellows shall be installed where required for expansion and contraction to prevent excessive strain on fittings and soldered joints.

(b) Galvanized steel pipe installations

(i) All galvanized steel pipes shall be medium gauge mild steel screwed and socketed pipes to SANS 62 and shall be normalised and marked as such by the manufacturer. Pipes shall be hot-dip galvanized to SANS 763.

(ii) All fittings shall be malleable cast-iron fittings to SANS 509 and galvanized to SANS 763.

(iii) All 80 mm diameter and larger pipes shall be joined with Class 16 flanged couplings to SANS 1123/1600. The bolts, nuts and spring washers to be used on these joints shall be cadmium-plated.

(iv) In pipe ducts and elsewhere pipes shall be fixed onto walls, soffits, etc, with approved type of supports, holderbats, clamps, etc. Brackets shall be designed to structurally support and fix the pipe system and shall have enough clearance from walls, soffits, etc, to insulate hot-water pipes and maintain equipment.

(v) Pipes shall be supported according to the manufacturer's specifications with approved brackets at the following maximum intervals:

PIPE DIAMETER (mm)	HORIZONTAL (metre)	VERTICAL (metre)
15 dia to 20 dia	1,200	1,830
32 dia to 40 dia	1,830	2,450
50 dia to 150 dia	2,450	3,050

(vi) Pipes shall be installed in such a manner as to prevent air locks. A minimum rise of 1:250 shall be maintained to high points, which shall be fitted with suitable air release valves.

(vii) All pipes shall be marked according to SANS 10140 or as specified by the Engineer. All surface pipes shall be painted.

(viii) Pipes shall be installed flush unless otherwise instructed by the Engineer.

(ix) Provision shall be made for thermal contraction and expansion.

(x) The type of pipe joint compound shall be approved by the Engineer and used sparingly with good quality hemp. For pipes larger than 80 mm diameter a jointing compound such as Epidermix 32 shall be used.

(xi) Any pipe buried shall have at least 900 mm cover and be coated and wrapped to SANS 1117 and tested in the presence of the Engineer.

(xii) All exposed hot-water pipes shall be lagged as specified.

(xiii) All pipework and fittings shall be pressure tested and sterilised as specified

(xiv) Valves shall be installed on all branch pipes and ball-o-stop valves on all connectors to basin pillar cocks, sink mixers, cistern type WCs and other fittings.

(xv) Approved type expansion bellows shall be installed where required for expansion and contraction to prevent excessive strain on fittings and pipe joints.

(c) <u>uPVC underground pipe installations</u>

(i) uPVC piping shall conform to SANS 966 with rubber ring type joints.

(ii) All bends shall be uPVC type fittings with rubber ring joints.

(iii) All other fittings such as T-pieces, reducers, flanges, etc, shall be bitumen-dipped cast-iron rubber ring jointed fittings to SANS 546.

(iv) No solvent weld type fittings will be allowed.

(v) All cast-iron fittings shall be coated and wrapped to SANS 1117.

(vi) All pipes shall be layed on a 100 mm sand-bedding cradle and covered with 300 mm sand before backfilling.

(vii) All backfilling shall be in accordance with SANS 1200 DB and to the Engineer's and approval.

(viii) Pipe trenching and bedding:

AREA	MINIMUM COVER	BEDDING TYPE	MAIN FILL
Vehicle traffic	1 100	Flexible pipe bedding as per SANS 1200 LB	Soilcrete
Under surface bed	600		Soilcrete
Other areas	900		90 % of modified AASHTO density

(ix) All thrust blocks shall be cast between the pipe and the undisturbed trench material.

(x) No concrete shall come into direct contact with the UPVC pipe. At the thrust blocks the bend shall be wrapped with a Densopol 80 HT Tape or similar approved.

(xi) HDPe pipe connections to uPVC pipes up to 50 mm can be done by means of SG Iron manufactured saddles with the appropriate gaskets and cadmium-plated bolts and nuts.

(xii) All pipe crossings under traffic areas shall be backfilled with soilcrete and compacted as specified.

(xiii) All pipework shall be pressure tested with all joints uncovered, to the satisfaction of the Engineer.

(xiv) Suitably sized air release valves built into valve chambers shall be installed at all high points of the pipeline.

(d) HDPe underground pipe installations

(i) HDPE piping shall be Type 4 HDPe pipe to SANS 533.

(ii) All fittings shall be of Plasson compression type and shall conform to ISO/DIS 3458.

(iii) All pipes shall be laid on a 100 mm sand bedding cradle and covered with 300 mm of sand of selected material.

(iv) All backfilling shall be in accordance with SANS 1200 DB and to the Engineer's and approval.

(v) Pipe trenching and bedding:

AREA	MINIMUM COVER	BEDDING TYPE	MAIN FILL
Vehicle traffic	1 100	Flexible pipe bedding as per SANS 1200 LB	Soilcrete
Under surface bed	600		Soilcrete
Other areas	900		90 % of modified AASHTO density

(vi) No concrete shall come into direct contact with the HDPe pipe. At these points the fittings shall be wrapped with Densopol 80 HT tape or similar approved.

(vii) All pipe crossings under traffic areas shall be backfilled with soilcrete and compacted as specified.

(viii) All pipework shall be pressure tested with all joints uncovered to the satisfaction of the Engineer.

(ix) Suitably sized air release valves built into valve chambers shall be installed at all high points of the pipeline.

(e) Valves

(i) Gate valves underground in valve chambers to connect to uPVC piping (65 mm NB and larger)

Gate valves are to be equipped with non-rising spindle, spherical graphite iron body to SANS 936 Grade 42, cast-iron nitrile butadiene rubber covered gate, stainless steel spindle, nitrile butadiene rubber O-rings and seals, cast-iron bonnet and gunmetal thrust collar to BS 1400 LG2.

The valves shall conform to SANS 664 and/or 665 and shall be capable of withstanding a working pressure of 1 600 kPa.

The valves shall be fitted with a square key spindle top to close the valves in clockwise direction and socket ends to SANS 665 to fit into uPVC Class 12 pipe and installed to detail.

(ii) Gate valves underground in valve chamber to connect to HDPe piping

The gate valves shall be of the dezincified brass type with brass gate, brass body, non-rising spindle and BSP threaded socket ends. The valves shall conform to SANS 776 Class 125. The valves shall be able to withstand a working pressure of 1 600 kPa. The valve shall be fitted with a hand wheel on an extended spindle shaft of 700 mm to close in a clockwise direction and installed to detail.

(iii) Gate valves above ground for temperatures up to 40 °C to connect to steel piping (65 mm NB and larger)

Gate valves are to be equipped with non-rising spindle, spherical graphite iron body to SANS 936 Grade 42, cast-iron nitrile butadiene rubber covered gate, stainless steel spindle, nitrile butadiene rubber O-rings and seals, cast-iron bonnet and gunmetal thrust collar to BS 1400 LG2.

The valves shall conform to SANS 664 and/or 665 and shall be capable of withstanding a working pressure of 1 600 kPa.

The valves shall be fitted with flanged ends to SANS 1123, table 16, hand wheel to close the valves in a clockwise direction and installed in an upright position or sideways to a maximum 90 ° from upright.

(iv) Gate valves above ground for temperatures above 40 °C to connect to steel piping (65 NB mm and larger)

Gate valves shall be equipped with non-rising spindle, spherical graphite iron body to SANS 963 Grade 42, cast-iron gate, gunmetal seat and gate rings, high-tensile bronze spindle, cast-iron bonnet and gunmetal thrust collar to BS 1400 LG2.

The valves shall conform to SANS 665 and shall be capable of withstanding a working pressure of 1 600 kPa and a temperature of 90 °C.

The valve shall be fitted with flanged ends to SANS 1123, table 16, hand wheel to close the valve in a clockwise direction and installed in an upright position or side ways to a maximum 90° from upright.

(v) Gate valves above ground to fit to copper pipes (65 mm NB and larger)

Gate valves shall be equipped with non-rising spindle, gunmetal bronze or dezincified brass body, gunmetal or dezincified brass gate and graphite asbestos packing in the gland.

The valve shall be fitted with a hand wheel to close in a clockwise direction and installed in an upright position or sideways to maximum 90° from upright.

The valve shall be equipped with flanges to SANS 1123, table 16, hand wheel to close the valve in a clockwise direction and installed in an upright position or sideways to a maximum 90° from upright.

(vi) Gate valves above ground for temperatures up to 100 °C (up to 50 mm NB)

The gate valves shall be of the dezincified brass type with brass gate, brass body, non-rising spindle and BSP threaded socket ends. The valve shall conform to SANS 776, Class 125.

The valves shall be able to withstand a working pressure of 1 600 kPa.

The valve shall be equipped with a hand wheel to close in a clockwise direction.

The valve shall be installed in an upright position or sideways to a maximum 90° from upright and shall be so placed with other fittings to be removable without cutting the pipework.

(vii) Ball-O-Stop valves (15 mm diameter - 25 mm diameter)

These valves shall be full-way ballcock type with BSP threaded ends. The valves shall conform to SANS 1056, Part 3, shall be rated for a test pressure of 2 000 kPa, and shall be chrome-finished when exposed.

(viii) Angle regulating valves

These valves shall be 15 mm chromium-plated angle regulating valves with a 350 mm chromium-plated copper tube and cap nuts where required.

(f) Strainers

(i) Strainers for connection to steel or UPVC pipes (65 mm NB and larger)

These strainers shall be of the Y-type with cast-iron body, stainless steel or bronze strainer element and shall be equipped with flanged ends to SANS 1123, table 16. The hole sizes of the strainer element shall be maximum 1 mm diameter and be removable without dismantling of pipework. The strainer shall be suitable for a temperature of up to 90 °C at a 1 000 kPa pressure rating and installed with the element facing downwards or a maximum of 45° sideways.

(ii) Strainers for connection to copper pipes (65 mm NB and larger)

These strainers shall be of the Y-type with bronze or dezincified brass body, stainless steel strainer element and must be equipped with flanged ends to SANS 1123, table 16. The hole sizes of the strainer element shall be maximum 1 mm diameter. The strainer element shall be removable without dismantling of pipework. The strainer shall be suitable for a temperature of up to 90 °C at a 1 000 kPa pressure rating and installed with the element facing downwards or a maximum of 45° sideways.

(iii) Strainers for connection to steel and copper pipes (up to 50 mm NB)

These strainers shall be of the Y-type with bronze or dezincified brass body, stainless steel strainer element and must be equipped with BSP threaded socket ends. The hole sizes of the strainer element shall be maximum 0,8 mm diameter. The strainer shall be suitable for a temperature of up to 90 °C at a pressure rating of 1 000 kPa and installed with the element facing downwards or a maximum of 45° sideways.

(g) Non-return valves

(i) Non-return valves for cold water (65 mm NB and larger)

The non-return valve shall be of the spring-loaded dual flap plate type fitted between two flanges (wafer).

The non-return valve shall be equipped with a cast-iron body, aluminium bronze plates, stainless steel springs and neoprene seals on the plates. The valves shall be suitable for a working pressure of 1 000 kPa.

(ii) Non-return valves for hot water (up to 100 mm NB) and cold water (up to 50 mm NB)

These non-return valves shall be of the spring-loaded piston type, with bronze or dezincified brass body, stainless steel spring and bronze disc with neoprene seal fitted with BSP threaded socket ends. The valve shall be suitable for a working pressure of 1 000 kPa and a temperature of up to 90 °C. All valves shall be installed as to be removable without extensive pipework removal.

(h) Air release valves and vacuum breakers

(i) Double orifice double-acting air release valves with sizes from 50 mm NB to 200 mm NB

This air release valve shall be fitted with small and large orifice. The air release valve shall be fitted with a cast-iron body, stainless steel or fibreglass balls, integral shut-off valve and flanged ends to SANS 1123, table 16.

The valve shall be suitable for maximum pressure of 1 600 kPa.

(ii) Single orifice air release valves for main water lines with sizes from 25 mm NB to 50 mm NB

This air release valve shall be fitted with a small orifice, cast-iron body, fibre glass or stainless steel ball float and BSP threaded inlet.

When the valve is installed a shut-off valve shall be installed on the inlet side.

The valve shall be suitable for maximum pressure of 1 600 kPa.

(iii) Single orifice double purpose air release valves for domestic water lines up to 15 mm NB

This air release valve shall be fitted with a stainless steel float, brass or cast steel body with an integral shut-off valve fitted.

The valve shall be capable to withstand a working pressure of 1 000 kPa at 110 °C.

(iv) Vacuum breaker up to 40 mm diameter

The vacuum breaker shall be fitted with neoprene seal, spring-loaded disc in a dezincified brass or bronze body. The valve shall seal watertight and shall be designed to withstand a working pressure of 1 000 kPa and a temperature of 90 °C.

(i) Pressure-reducing valves

(i) Combination pressure-reducing stations

Where a high peak flow as well as a small flow can occur and the small flow is out of the range of the large pressure-reducing valve, a small pressure-reducing valve is installed in parallel with the large pressure-reducing valve. The two pressure-reducing valves in parallel shall be set according to the manufacturer's specification.

(ii) Large pressure-reducing valves (65 mm NB and larger)

This pressure-reducing valve shall be equipped with a cast-iron body, neoprene nylon-reinforced diaphragm, bronze seal disc washer, stainless steel shaft and flanged ends. The valve shall be pilot operated and shall be designed to handle high flows at a minimum head loss.

The valve must be adjustable to handle a wide range of incoming pressures at a constant downstream pressure.

The valve shall be equipped with flanged ends to SANS 1123, table 16.

(iii) Small pressure-reducing valves (15 mm NB to 50 mm NB)

This pressure-reducing valve shall be equipped with brass body, balanced single seat and integral strainer. The valve shall be able to handle a wide range of incoming pressures while the downstream pressure stays constant with maximum inlet pressure of 1 000 kPa and a maximum water temperature of 40 °C.

The valve shall be equipped with BSP male threaded brass union couplings.

(j) Water meters

(i) Combination water meters

Where high peak flow, as well as a small flow, can occur and the small flow is out of the registration range of the large water meter, a small water meter shall be installed in parallel with the large water meter to cater for the small flows with integral automatic change-over valves. These valves shall be designed to have a minimum pressure drop at operating point.

(ii) Water meters (50 mm NB and larger)

These water meters shall be of the dry type with all gears and transmission and roller counters in a dry head, and shall be equipped with flanged ends to SANS 1123, cast-iron body with high quality corrosion-proof coating. The meter shall be protected from magnetic fields and sealed to prevent tampering with adjustments. The meter must be able to work up to a pressure of 1600 kPa under a maximum water temperature of 40 °C. The scale of meter must be in cubic metre (m^3) and equipped with needle indicators reading in litres. Accuracy of meter shall be not less than 98 %.

The meters shall be installed with leading and trailing lengths of pipes to the manufacturer's specification.

(iii) Water meters (up to 50 mm NB)

The meter shall be of the volumetric rotary piston type with brass body equipped with union couplers. The meter reading must be in kilolitres. The meter shall have an accuracy of not less than 98 %. The meter must be able to operate up to a water pressure of 1000 kPa at a water temperature of 40 °C.

The meters shall be installed with leading and trailing lengths of pipes to the manufacturer's specification.

(k) Adjustable balancing valves

Adjustable balancing valves shall be supplied and installed as indicated on the applicable drawings. A portable differential pressure meter shall be used, with all the necessary pipes, shut-off valves and air release valves to set the balancing valves. A graph chart shall be supplied to indicate the flow units against the valve adjustment and as the pressure differential over the valve.

The pressure gauge shall be calibrated according to the current accepted SI units.

The calibrated adjustable balancing valves shall be of the angle valve type equipped with bronze valve body, bronze disc, internal seals with BSP threaded ends. The valve shall be fitted with stop-cock connection ends on inlet and outlet onto which the differential pressure gauge can be coupled. The valve shall be equipped with an indicator on the valve handle to show the position of the valve opening. The valve shall be suitable for operating at a temperature of 90 °C against a pressure of 1 000 kPa.

(l) Semi-conductive reheating tape for hot-water pipes

Semi-conductive reheating tape shall be strapped to the hot-water pipes under the thermal insulation. This reheating tape shall be installed strictly according to the manufacturer's specification.

The system shall be fitted with all the necessary end seals, tee splices, straps, etc, as required by the supplier.

The reheating tape shall be of the self-regulating type equipped with a parallel circuit, self-regulating conductive core, polyolefin jacket and tinned copper braid on the outside.

The reheating tape shall be sized to maintain an operating temperature of 60 °C of water inside the pipe.

(m) Expansion bellows

(i) Expansion bellows for pipes (50 mm NB and larger)

Expansion bellows shall be of the rubber-lined type fitted between flanges. These bellows shall be suitable for an operating temperature of -10 °C to 110 °C at an operating pressure of 1 500 kPa. The bellows shall be installed strictly in accordance with the manufacturer's specifications.

(ii) Expansion bellows for copper pipes (up to 40 mm NB)

These expansion bellows shall have a copper body with corrugated stainless steel lining and soldered capillary type couplings. The bellows shall be capable to withstand a working pressure of 600 kPa

at a temperature of 140 °C. Installation shall be strictly in accordance with the manufacturer's specifications.

(n) Lagging of hot-water pipes

(i) Preformed closed cell flame retarded flexible insulation sections

Where pipes are installed in service ducts, ceiling voids and where specified the pipes shall be insulated with Thermaflex preformed pipe insulation sections. This insulation shall be used with pipe systems where the maximum temperature is 80 °C. For a temperature higher than 80 °C preformed fibreglass sections shall be used with galvanized sheet metal muffs.

All bends and T-pieces shall be cut in a 45° mitre box to form a neat joint. All joints shall be glued together with a contact adhesive supplied by the manufacturer. Pipe sizes larger than 50 mm diameter shall be insulated with preformed fibreglass sections with canvas covers glued together with cold wood glue.

Thermaflex thickness for various pipe sizes shall be as follows:

PIPE SIZE (STEEL)	PIPE SIZE (COPPER)	THERMAFLEX THICKNESS
50 mm dia	54 mm dia	20 mm
40 mm dia	42 mm dia	20 mm dia
32 mm dia	35 mm dia	15 mm dia
25 mm dia	28 mm dia	15 mm dia
20 mm dia	22 mm dia	15 mm dia
15 mm dia	15 mm dia	15 mm dia

(ii) Preformed fibreglass sections with galvanized sheet metal muffs

All hot-water pipes in service tunnels, service corridors and where exposed to damage and/or weather shall be insulated with preformed fibreglass sections covered with galvanized sheet metal muffs in a watertight manner. Sheet metal muffs shall be installed with the joints overlapping at least 50 mm and the longitudinal overlap pointing downwards to prevent ingress of water. The sheet metal muff shall be strapped with 10 mm galvanized straps by means of a strapping tool with a minimum of 2 straps/section. All pipe bends, T-pieces, etc, shall be insulated with 25 mm diameter fibreglass rope covered with a 12 mm thick layer of self-setting fibre cement. A reinforcing gauge shall be wrapped over the fibre cement while wet and painted with mastic paint when dry.

Fibreglass section thickness for the various pipe sizes shall be as follows:

PIPE SIZE (STEEL)	PIPE SIZE (COPPER)	FIRBREGLASS THICKNESS
100 mm dia	108 mm dia	50 mm dia
80 mm dia	76 mm dia	40 mm dia
65 mm dia	67 mm dia	40 mm dia

PIPE SIZE (STEEL)	PIPE SIZE (COPPER)	FIRBREGLASS THICKNESS
40 mm dia	54 mm dia	25 mm dia
40 mm dia	42 mm dia	25 mm dia
32 mm dia	35 mm dia	25 mm dia
25 mm dia	28 mm dia	20 mm dia
20 mm dia	22 mm dia	20 mm dia
15 mm dia	15 mm dia	20 mm dia

AA 09.05 SANITARY AND BRASSWARE EQUIPMENT

Repair work to the sanitary and brassware equipment is detailed in the Particular Specification and shall include but not be limited to the following:

(a) Damaged and/or broken irreparable sanitary and brassware equipment shall be replaced with equal specification equipment or approved alternative. These shall be installed strictly to the manufacturer's specifications.

(b) Sanitary and brassware equipment that are unsuitable for the purpose and application they serve are to be replaced with suitable equipment.

(c) The quantity of sanitary and brassware equipment for the number of people and application they serve, shall be investigated in accordance with the current SANS 10400 application regulations. If found to be insufficient these facilities shall be upgraded only if approved by the Engineer.

(d) Loose sanitary ware shall be re-fixed and bracketed to structures in accordance with the manufacturer’s specifications.

(e) Stained sanitary ware equipment shall be cleaned, where possible, with approved cleaning agent in accordance with the manufacturer’s specification.

(f) All cisterns are to be cleaned out and filling and flushing mechanisms shall be serviced and repaired. Where beyond repair status these items shall be replaced with equal specification or approved alternatives.

(g) All worn-out and leaking flush valves are to be repaired by utilising the manufacturer’s replacement kits. Where flush valves are damaged beyond repair these shall be replaced with equal specification or approved alternatives.

(h) All pillar taps, mixers, sink taps and other taps are to be serviced, utilising repair kits. Where equipment is beyond repair these items shall be replaced with equal specification or approved alternatives. Where equipment connections are loose these shall be properly secured to sanitary ware and other equipment.

(i) Leaking, corroded or damaged chromium-plated flush pipes to water-closets and urinals are to be replaced where required.

(j) Replace missing and/or damaged shower gratings with equal specification or approved alternatives.

(k) Service and repair water metering taps by utilising manufacturer’s replacement kits where necessary. Where damaged beyond repair the complete item shall be replaced with equal specification or approved alternative.

(l) Replace missing or damaged tap handles with matching handles from the manufacturer of the tap.

(m) Readjust all timing mechanisms on flush valves and metering taps in accordance with repairs and services to the correct flushing and flow times.

(n) Replace damaged or missing basin and/or sink mixer swivel arms with equal specification or approved alternative.

(o) Replace missing or damaged toilet seats and covers with equal specification or approved alternatives.

(p) Repair and service urinal syphonic valves with replacement kits from manufacturer. Where no spares are available or equipment is damaged beyond repair, these items are to be replaced with equal specification or approved alternatives.

(q) Repair and clean out all bottle traps. Bottle traps that are damaged beyond repair are to be replaced with equal specification or approved alternatives.

(r) Repair and service bath taps and mixers by utilising manufacturer's replacement kits. Where damaged beyond repair, the taps and mixers shall be replaced with equal specification or approved alternatives.

AA 09.06 FIRE WATER PIPED RETICULATION NETWORKS

AA 09.06.01 General

Repair work to the fire water piped reticulation networks is detailed in the Particular Specification and shall include but no be limited to the work described below. This specification only covers the water piped reticulation for the fire water protection system, while the equipment to this installation, such as fire hydrants, hose reels and extinguishers, are covered and detailed in Technical Specification JC: Conventional Fire Fighting Equipment. This specification has to be read in conjunction with the afore-mentioned specification.

(a) Replace damaged, broken, leaking, corroded above and underground pipework, fittings and equipment.

(b) Repair, replace and service valves which shall include new gaskets, gland packings, seals, bolt and nuts, etc.

(c) Where valves do not close properly, all these valves are to be refurbished, descaled and if necessary replaced.

(d) Repair, service and check the proper functioning of all non-return valves and backflow preventers.

(e) Repair, service, readjust and calibrate all pressure gauges.

(f) Repair bracketing systems including fixing and repair of existing brackets and the provision of additional brackets where required.

(g) Report all problems related to fire fighting equipment to the Engineer.

(h) Water storage tanks are to be emptied, cleaned out, repaired, sealed and put back into operation. Ball float and/or filling valves to these tanks are to be serviced and repaired where required.

(i) Pressure test and sterilise repaired new installation and equipment.

(j) Reinstate and make good walls, tiling, floors, concrete, finishes, holes, chases, surfaces, etc, to an acceptable level where any repair, upgrade and/or service work have been executed.

(k) Record pressure readings on supply to installation.

AA 09.06.02 Material and equipment specification for fire water piped reticulation networks

Materials and equipment to be used for repair items shall be suitable and/or adaptable to the existing installation and shall comply with the following:

(a) Galvanized steel pipe installation

(i) All galvanized steel pipes shall be medium gauge mild steel screwed and socketed pipes to SANS 62 and shall be normalised and marked as such by the manufacturer. Pipes shall be hot-dip galvanized to SANS 763.

(ii) All fittings shall be malleable cast-iron fittings to SANS 509 and galvanized to SANS 763.

(iii) All 80 mm diameter and larger pipes shall be joined with Class 16 flanged couplings to SANS 1123/1600. The bolts, nuts and spring washers to be used on these joints shall be cadmium-plated.

(iv) In pipe ducts and elsewhere pipes shall be fixed onto walls, soffits, etc, with approved type of supports, holderbats, clamps, etc. Brackets shall be designed to structurally support and fix the pipe system and shall have enough clearance from walls, soffits, etc, to maintain equipment.

(v) Pipes shall be supported according to the manufacturer's specifications at the following maximum intervals:

NORMAL SIZE (mm)	HORIZONTAL (mm)	VERTICAL (mm)
15 dia to 20 dia	1 200	1 830
32 dia to 40 dia	1 830	2450
50 dia to 150 dia	2 450	3 050

(vi) All pipes shall be marked according to SANS 10140 or as specified by the Engineer. All surface pipes shall be painted.

(vii) Pipes shall be installed on the surface, unless otherwise specified.

(viii) Provision shall be made for thermal contraction and expansion.

(ix) The type of pipe joint compound shall be approved by the Engineer and used sparingly with good quality hemp. For pipes larger than 80 mm diameter a jointing compound such as Epidermix 32 shall be used.

(x) Any buried pipe shall have at least 900 mm cover and be coated and wrapped to SANS 1117 and tested in the presence of the Engineer.

(xi) All pipework and fittings shall be pressure tested as specified.

(b) uPVC underground pipe installations

(i) uPVC piping shall conform to SANS 966 with rubber ring type joints.

(ii) All bends shall be uPVC type fittings with rubber ring joints.

(iii) All other fittings such as T-pieces, reducers, flanges, etc, shall be bitumen-dipped cast-iron rubber ring jointed fittings to SANS 546.

(iv) No solvent weld type fittings will be allowed.

(v) All cast-iron fittings shall be coated and wrapped to SANS 1117.

(vi) All pipes shall be laid on a 100 mm sand bedding cradle and covered with 300 mm sand before backfilling.

(vii) Pipe trenching and bedding:

AREA	MINIMUM COVER	BEDDING TYPE	MAIN FILL
Vehicle traffic	1 100	Flexible pipe bedding as per SANS 1200 LB	Soilcrete
Under surface bed	600		Soilcrete
Other areas	900		90 % of modified AASHTO density

(viii) All thrust blocks shall be cast between the pipe and the undisturbed trench material.

(ix) No concrete shall come into direct contact with the uPVC pipe. At the thrust blocks the bend shall be wrapped with Densopol 80 HT tape or similar approved.

(x) HDPe pipe connections to uPVC pipes up to 40 mm diameter can be done by means of SG Iron manufactured saddles with the appropriate gaskets and cadmium-plated bolts and nuts.

(xi) All pipe crossings under traffic areas shall be backfilled with soilcrete and compacted as specified.

(xii) All pipework shall be pressure tested with all joints uncovered to the satisfaction of the Engineer.

(xiii) Suitably sized air release valves built into valve chambers shall be installed at all high points of the pipeline.

(xiv) Duckfoot bends shall be used to all fire hydrants at the foot of fire hydrants. This to be cast into thrust blocks.

(c) HDPe underground pipe installations

(i) All HDPe piping shall be Type 4 HDPe pipe to SANS 533.

(ii) All fittings shall be of Plasson compression type and shall conform to ISO/DIS 3458.

(iii) All pipes shall be laid on a 100 mm sand bedding cradle and covered with 300 mm of sand or selected material.

(iv) All backfilling shall be to the SANS 1200 DB and to the Engineer's approval.

(v) Pipe trenching and bedding:

AREA	MINIMUM COVER	BEDDING TYPE	MAIN FILL
Vehicle traffic	1 100	Flexible pipe bedding as per SANS 1200 LB	Soilcrete
Under surface bed	600		Soilcrete
Other areas	900		90 % of modified AASHTO density

(vi) No concrete shall come into direct contact with the HDPe pipe. At these points the fittings shall be wrapped with Densopol 80 HT tape or similar approved.

(vii) All pipe crossings under traffic areas shall be backfilled with soilcrete and compacted as specified.

(viii) All pipework shall be pressure tested with all joints uncovered to the satisfaction of the Engineer.

(ix) Suitably sized air release valves built into valve chambers shall be installed at all high points of the pipeline.

(d) Valves

(i) Gate valves underground in valve chambers to connect to uPVC piping (65 mm NB and larger)

Gate valves are to be equipped with non-rising spindle, spherical graphite iron body to SANS 936 Grade 42, cast-iron nitrile butadiene rubber covered gate, stainless steel spindle, nitrile butadiene rubber O-rings and seals, cast-iron bonnet and gunmetal thrust collar to BS 1400 LG2.

The valves shall conform to SANS 664 and/or 665 and shall be capable of withstanding a working pressure of 1 600 kPa.

The valves shall be fitted with a square key spindle top to close the valves in clockwise direction and socket ends to SANS 665 to fit into uPVC.

Valves are to be provided with locking devices to lock valves in open position.

(ii) Gate valves underground in valve chambers to connect to uPVC piping

The gate valves shall be of the dezincified brass type with brass gate, brass body, non-rising spindle and BSP threaded socket ends. The valves shall conform to SANS 776 Class 125. The valves shall be able to withstand a working pressure of 1 600 kPa. The valve shall be fitted with a hand wheel on an extended spindle shaft of 700 mm to close in a clockwise direction and installed to detail.

(iii) Gate valves above ground to connect to steel (65 NB and larger)

Gate valves are to be equipped with non-rising spindle, spherical graphite iron body to SANS 936 Grade 42, cast-iron nitrile butadiene rubber covered gate, stainless steel spindle, nitrile butadiene rubber O-rings and seals, cast-iron bonnet and gunmetal thrust collar to BS 1400 LG2.

The valves shall conform to SANS 664 and/or 665, and shall be capable of withstanding a working pressure of 1 600 kPa.

The valves shall be fitted with flanged ends to SANS 1123/1600, hand wheel to close the valves in a clockwise direction and installed in an upright position or sideways to maximum 90° from upright.

These valves shall be equipped with locking devices to lock valves in open position.

(iv) Gate valves above ground (up to 50 mm NB)

The gate valves shall be of the dezincified brass type with brass gate, brass body, non-rising spindle and BSP threaded socket ends. The valves shall conform to SANS 776 Class 125.

The valves shall be able to withstand a working pressure of 1 600 kPa.

The valve shall be equipped with a hand wheel to close in a clockwise direction.

The valves shall be installed in an upright position or sideways to maximum 90° from upright and shall be so placed with other fittings as to be removed without cutting the pipework.

The valves shall be equipped with locking devices to lock valves in open position.

AA 10 MAINTENANCE TO INSTALLATIONS, SYSTEMS AND EQUIPMENT

AA 10.01 GENERAL

Monthly maintenance responsibilities for each installation including all units and components as specified, shall commence with access to the site. A difference shall be made in payment for the maintenance prior to and after practical completion of repair work.

Maintenance responsibilities of the completed installation shall commence upon the issue of a certificate of practical completion for repair work, and shall continue for the remainder of the 36-month contract period.

This part of the Contract shall include routine preventative maintenance, corrective maintenance, and breakdown maintenance, as defined in Additional Specification SA: General Maintenance, for the specified installations described under the section AA 01 of this document.

The maintenance work to be performed and executed shall be done strictly in accordance with Additional Specification SA: General Maintenance, and as specified in the Particular Specification and this specification.

The said maintenance work shall be executed in accordance with the relevant codes of practice, standards, regulations, municipal laws and by-laws and the manufacturer's specifications and codes of practice.

The maintenance schedules and frequency shall be developed under the maintenance control plan to be instituted by the Contractor.

All new equipment, components and materials supplied and installed under the maintenance Contract shall be furnished with prescribed manufacturer's guarantees.

The maintenance work and items are to be categorised for each maintenance activity under the following headings:

(a) Rainwater disposal system
(b) Soil and wastewater drainage systems
(c) Domestic water distribution and reticulation systems
(d) Sanitary and brassware equipment
(e) Fire water piped reticulation networks.

AA 10.02 ROUTINE PREVENTATIVE MAINTENANCE

This routine maintenance of the installations, systems and equipment shall be done in accordance with Additional Specification SA: General Maintenance and the Particular Specification related to this work.

The routine maintenance work to be performed and executed shall include, but not be limited to the items listed in tables AA 10.02/1, AA 10.02/2, AA 10.02/3, AA 10.02/4 and AA 10/02/5 below under each heading.

These actions and findings shall be logged and reported on the relevant approved schedules and reports.

TABLE AA 10.02/1 - RAINWATER DISPOSAL SYSTEM

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCEFREQUENCY
1	Visually inspect and report on complete system	Monthly
2	Repair any visible maintenance defects that became evident during the monthly inspection.	Monthly
3	Clean out and clear all rainwater gutters and full bores	Monthly
4	Clean out and clear all catch pits, channel drains and floor outlets	Monthly
5	Clean and unblock all drain pipes	Monthly
6	Check gutter and pipe bracketing system and repair and replace if necessary	Monthly
7	Check alignments of gutters	Monthly
8	Check and inspect all rainwater outlet gratings and replace if necessary	Six-monthly
9	Check and inspect manhole covers and frames for damages and replace if necessary	Six-monthly
10	Paint repairs to surface piping and equipment	Annually

TABLE AA 10.02/2 - SOIL AND WASTEWATER DRAINAGE SYSTEM

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCEFR EQUENCY
1	Visually inspect and report on complete installation	Monthly
2	Repair any visible maintenance defects that became evident during the monthly inspection.	Monthly
3	Check, service and clean out grease traps	Monthly
4	Check, service and clean out oil separators	Monthly
5	Check, inspect and clean out all floor drains	Monthly
6	Check, inspect and clean out all gullies	Monthly
7	Check, inspect, report and unblock any blockage that occurs	Monthly
8	Check, inspect, repair/replace and clean out all equipment traps	Monthly
9	Check, inspect, service, repair/replace all vacuum and two-way vents	Four-monthly
10	Replace broken or missing gully gratings	Four-monthly
11	Check, inspect, repair or replace all manhole covers and frames and builder's work to manholes	Four-monthly
12	Check, inspect, repair or replace all inspection eyes, end caps and cleaning eye covers	Four-monthly
13	Check, inspect, repair or replace all bracketing systems	Four-monthly
14	Check, inspect and repair manhole benching.	Annually
15	Paint repairs to surface piping and equipment	Annually
16	Rodding of all main sewer lines	At start of Contract and Annually

TABLE AA 10.02/3 - DOMESTIC WATER DISTRIBUTION AND RETICULATION SYSTEMS

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCE FREQUENCY
1	Visually inspect and report on complete system	Monthly
2	Repair any visible maintenance defects that became evident during the monthly inspection.	Monthly
3	Log all water meter readings	Monthly
4	Log all pressure gauge readings	Monthly
5	Check, inspect, report and repair leaks	Monthly
6	Check, inspect and test operation of all valves on site	Monthly
7	Clean out all strainers	Monthly
8	Check, inspect, test, service and repair/replace all	Four-monthly

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCE FREQUENCY
	non-return valves	
9	Check, service, repair or replace all ball float valves	Four-monthly
10	Check, inspect, service test and repair/replace all safety and expansion release valves	Six-monthly
11	Check, inspect, repair or replace all bracketing systems	Six-monthly
12	Check, inspect, test, service, repair/replace all geyser installations components (Includes replacement of geyser elements and vacuum breakers)	Six-monthly
13	Check, inspect, test, service, repair/replace all solar geyser installation components (Includes replacement of geyser elements, anodes and vacuum breakers)	Six-monthly
14	Check, inspect, test, service, repair/replace all heat pump installation components (Includes full service as required by the manufacturer specifications as well as replacement or top-up of refrigerant if required)	Six-monthly
15	Check, inspect, service, repair/replace all air release valves and vacuum breakers	At start of Contract and Annually
16	Replace all valve gaskets, gland packings and seals	At start of Contract and Annually
17	Sample water supply and chemical analyses to be provided by approved company	At start of Contract and Annually
18	Bulk Water storage tanks to be emptied, cleaned out, inspected, repaired and resealed where necessary	At start of Contract and Annually
19	Check, inspect, service, repair and readjust all pressure-reducing valves	At start of Contract and Annually
20	Paint repairs to piping, fittings and equipment	Annually

TABLE AA 10.02/4 - SANITARY AND BRASSWARE EQUIPMENT

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCE FREQUENCY
1	Replace all flushing valve (flush masters) internal parts with replacement kits	Once per Contract
2	Visually inspect and report on complete installation	Monthly
3	Repair any visible maintenance defects that became evident during the monthly inspection.	Monthly
4	Check, inspect, report and repair all leaks	Monthly
5	Inspect, repair/replace defective WC seats and covers	Monthly
6	Check, inspect, service, repair/replace all cistern flushing mechanisms	Monthly
7	Check, inspect, repair, fix and where necessary replace sanitary ware mountings and brackets	Four-monthly
8	Check, inspect, service, repair/replace all brassware	Four-monthly
9	Check, inspect, service, repair/replace all sanitary	Four-monthly

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCE FREQUENCY
	ware	
10	Check, inspect, service, repair, readjust all flushing valves	Four-monthly
11	Check, inspect, repair/replace all shower gratings	Four-monthly
12	Check, inspect, repair, service, replace all missing valves	Six-monthly
13	Stained equipment to be cleaned with approved manufacturer's cleaning agent	Six-monthly
14	Paint repairs to all equipment	Annually
15	Replace all tap washers	At start of Contract and Annually
16	Replace all tap gland packings	At start of Contract and Annually
17	Replace missing tap handles	As occur
18	Replace missing bath, basin, sink, etc, plugs	As occur

TABLE AA 10.02/5 - FIRE WATER PIPED RETICULATION NETWORKS

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCE FREQUENCY
1	Visually inspect and report on complete system	Monthly
2	Test complete firefighting system and ensure storage water is circulated and disinfected.	Monthly
3	Repair any visible maintenance defects that became evident during the monthly inspection.	Monthly
4	Repair any visible maintenance defects that became evident during the monthly inspection.	Monthly
5	Report any failures/breakage of fire fighting equipment to the Engineer	Monthly
6	Log all pressure gauge readings	Monthly
7	Check, inspect, report and repair all leaks	Monthly
8	Check, inspect, service, repair/replace all non-return valves and backflow preventers	Four-monthly
9	Inspect, service, readjust and calibrate all pressure gauges	Four-monthly
10	Check, inspect, repair or replace all bracketing systems	Six-monthly
11	Replace all valve gaskets, gland packings and seals	At start of Contract and Annually
12	Water storage tanks to be cleaned out resealed/repaired if necessary	At start of Contract and Annually

AA 10.03 CORRECTIVE MAINTENANCE

The corrective maintenance of the installations, systems and equipment shall be done in accordance with Additional Specification SA: General Maintenance and the Particular Specification related to this work.

The Contractor shall inspect and check all equipment, materials, systems and installation for any pending breakdowns, maladjustments or anomalies of equipment.

The Contractor shall report and take actions to correct such deficiencies.

AA 10.04 BREAKDOWN MAINTENANCE

Breakdown maintenance of the installations, systems and equipment shall be done in accordance with Additional Specification SA: General Maintenance.

All breakdown problems experienced shall be acted upon within the time limitations allowed in the General Maintenance documents.

All breakdown maintenance shall be done in accordance with the related specifications, standards, regulations and codes.

The Contractor shall have access to the necessary spares, equipment and tools for the expected breakdowns.

PARTICULAR SPECIFICATION

PAA PLUMBING AND DRAINAGE INSTALLATION

CONTENTS

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PAA 01 SCOPE

This specification covers the particulars of the servicing and maintenance work to the plumbing and drainage installations at the various sites. This particular specification shall be read in conjunction with the Technical Specification AA: Plumbing and Drainage Installation, and all additional and technical specifications compiled as part of this document, in particular the following Additional Specifications:

SA: General Maintenance
SC: General Decommissioning, Testing and Commissioning Procedures

PAA 02 GENERAL DESCRIPTION OF INSTALLATIONS

The existing plumbing and drainage installations provide potable water to the various nurseries at SANBI Lowveld NBG. The potable cold-water installation is provided with supply points from the underground reticulation networks outside the nurseries to an above ground reticulation network via service ducts, ceiling voids and chased into walls to outlet points.

This contract also provides for repair and maintenance of the fire water piped reticulation network, excluding the fire fighting equipment, which is dealt with under Particular Specification PJC: Conventional Fire Fighting equipment.

Technical details of sanitary and brassware, as well as the plumbing and drainage installations are given in PAA 03.

PAA 03 TECHNICAL DETAILS OF EXISTING INSTALLATIONS

At the time of compilation of this document the existing installations consisted of the equipment and plant listed below with their relevant technical details.

PAA 03.01 DOMESTIC WATER PIPING: GENERAL

	PIPE	FITTINGS	EQUIPMENT
Cold-water piping	Cu GMS	Conex, soldered GMS	Brass gate shut-off valve Brass gate shut-off valve

PAA 05 DETAILS OF WORK

The following work shall form part of the repair work to Building Services. This work shall be done in accordance with the relevant regulations, codes, specifications and Technical Specification AA: Plumbing and Drainage Installations, as set out in this document. The work to be included is set out in PAA 05.01 and PAA 05.02 below and shall be read in conjunction with the Schedule of Quantities and Technical Specifications.

The repair work shall be carried out in accordance with the requirements of Additional Specification SC: General Decommissioning, Testing and Commissioning Procedures.

PAA 05.01 GENERAL DESCRIPTION OF WORK

PAA 05.01.01 The Contractor shall at the start of the Repair and Maintenance Contract inspect the items, systems, equipment, components and installations listed below. This inspection shall involve the determination of any defects, leaks, damages, shortfalls, structural soundness, repairs required, details of existing equipment, suitability of equipment for the purpose it serves, etc. The Contractor shall report back to the Engineer in writing on all the above and the following items. No repair work shall commence prior to approval by the Engineer:

(a) Domestic water piped installation, including fittings, valves, strainers, lagging and cladding, non-return valves, safety valves, etc;

(b) Fire water piped installation, including fittings, valves, non-return valves, pressure gauges, etc;

(c) Bracketing system;

(d) Valves, pressure reducing valves, strainers, vacuum breakers, safety valves, non-return valves, lagging and cladding, etc.

(e) Sprinklers and filters, etc.

PAA 05.01.02 The general scope of work at the time of going on tender is defined as follows:

(a) Replacing of irreparably damaged, missing and unsuitable sanitary and brassware, including the isolation, removal and stripping of the existing equipment;

(b) Replacing of irreparably damaged, corroded and unsuitable sanitary drainage piping, including fittings, brackets, traps, floor drains, oil and grease separators, cleaning eyes and gullies, etc;

(c) Replacing of irreparably damaged, corroded and unsuitable domestic water piping, including fittings, brackets, valves, strainers, water meters, lagging and cladding, etc;

(d) Replacing of irreparably damaged, corroded and unsuitable fire water piping, including fittings, brackets, valves, non-return valves, pressure gauges, etc;

(e) Replacing of irreparably damaged and corroded domestic or industrial geysers, including valves, pressure-reducing valves, air release valves, strainers, non-return valves, vacuum breakers and safety valves;

(f) Servicing, cleaning and repair of existing domestic water and drainage pipe installations, including traps, floor drains, gullies, manholes, valve chambers,

grease and oil separators, brackets, valves, vacuum breakers, strainers, pipe lagging and cladding, etc;

(g) Servicing and repair of existing fire water piped reticulation, including fittings, valves, pressure gauges, brackets, etc;

(h) Handing over of complete systems on completion of the repair work to the satisfaction of the Engineer, when the maintenance period shall commence;

(i) The supply and compilation of operating and maintenance manuals;

(j) The testing, adjusting and commissioning of all systems;

(k) The introduction of a maintenance control plan, including logging, recording and control procedures.

PAA 05.02 REPAIR WORK TO PLUMBING AND DRAINAGE INSTALLATION

The repair work to this installation shall at least include, but not be limited to the work listed below. Any items, components or installations not detailed in particular but found to be defective or inoperative during the inspection and report phase, shall be repaired or replaced as instructed by the Engineer.

PAA 05.02.01 SANBI Lowveld NBG

(i) Service and repair domestic hot and cold-water installations, including pressure testing of existing systems, and replace items that are beyond repair. Where necessary, replace entire system with capillary soldered copper pipe system.

(ii) Service and repair drainage system, including rodding of system, and replace damaged or leaking pipes and fittings, manhole covers, cleaning and inspection eyes, gullies and gully gratings.

(iii) Service and repair sprinklers and filters.

PAA 06 MEASUREMENT AND PAYMENT

All new building work and repair work to existing structures and buildings necessitated by repairs to the plumbing and drainage services as scheduled shall be done in accordance with the structural and building section of the Technical and Particular Specifications. The costs of such building and repair works shall be deemed to be included in the tendered rates for the applicable items as scheduled in this section.

PAA.01 INSPECTION AND REPORT ON EXISTING INSTALLATIONS ..... ……Unit: item

The unit of measurement shall be the item reported on.

The tendered rate shall include full compensation for the inspection and written report on all items, systems, components, equipment and installations, including the establishment of defects, leaks, damage, shortfalls, structural soundness, repairs required, details of existing equipment and suitability of the equipment for the purpose it serves.

PAA.03 ISOLATION, STRIPPING, DISMANTLING AND REMOVAL **OF EXISTING BRASSWARE, SANITARY WARE AND PIPING INSTALLATIONS** ..... …..……...Unit: number, metre

The unit of measurement shall be the number of each item of brassware and sanitary ware and metre of piping removed, including fixtures and fittings.

The tendered rates shall include full compensation for the isolation, dismantling and removal of irreparably damaged, broken and/or unsuitable brassware (flush valves, taps, mixers, shower roses, under tile stop-cocks, demand bib taps, hose bib taps, shut-off valves, etc) and sanitary ware (water closets, cisterns, basins, urinals, baths, wash troughs, sinks, etc) including all associated pipe work, brackets, traps, pan connectors, etc.

The tendered rates shall also include full compensation for the isolation, stripping, dismantling and removal of irreparably damaged, broken or unsuitable pipe work installed on surface, underground, chased into walls, in ceiling voids and/or service ducts, as well as the plugging off of connections to this pipe work.

The tendered rate shall also include full compensation for the removal off site and/or to storage of all removed items as mentioned above.

PAA.04 **ISOLATION, STRIPPING, DISMANTLING AND REMOVAL OF EXISTING GEYSER INSTALLATIONS** ..... ……..Unit: number

The unit of measurement shall be the number of each geyser installation removed, including associated pipe work and fittings.

The tendered rates shall include full compensation for the isolation, stripping, dismantling and removal of irreparably damaged, broken and/or corroded domestic geysers, including shut-off valves, non-return valves, strainers, pressure-reducing valves, vacuum breakers, air release valves, safety valves, etc, and the removal off site.

PAA.05 **SUPPLY AND INSTALLATION OF SANITARY WARE AND BRASSWARE**……..……Unit: metre, number

The unit of measurement shall be the number of each item of sanitary and brassware supplied and installed, including all associated pipe work and fittings.

The tendered rate shall include full compensation for the supply, delivery, positioning, installation, testing, cleaning, commissioning and hand-over of sanitary and brassware including all necessary pipe work, traps, brackets, fittings, bends, junctions, cleaning eyes, etc, to connect the sanitary and brassware to the existing water supply and/or drainage installation.

The tendered rate shall also include full compensation for chasing and/or building into walls and the reinstating of existing surfaces such as floors, walls, ceilings, etc.

PAA.06 **SUPPLY AND INSTALLATION OF DRAINAGE PIPING INSTALLATION**…..... ……....Unit: metre, number cubic meter

The unit of measurement shall be the metre of each type of piping or fittings in the installation supplied and installed, including all fixtures.

The tendered rates shall include full compensation for the supply, delivery, installation, testing, cleaning, commissioning and handover of new drainage piping, installed on surface against walls or soffits, underground, in ceiling voids, chased or built into walls and/or service ducts, including all necessary bends, junctions, tees, cleaning eyes, covers, traps, floor drains, gratings, brackets, hangers, etc, to hand over a complete and effective installation that complies with local government regulations.

The tendered rates shall also include full compensation for the necessary underground works such as excavation, pipe bedding, fill blanket, backfilling and compaction and for the reinstatement of existing surfaces such as floors, walls, ceiling, roads, paving, etc, as well as connection to the existing drainage installation.

PAA.07 **SUPPLY AND INSTALLATION OF DOMESTIC WATER PIPING INSTALLATION** ..... …….. Unit: metre

The unit of measurement shall be the metre of each type of piping in the installation supplied and installed, indicating all fixtures and fittings.

The tendered rates shall include full compensation for the supply, delivery, installation, testing, cleaning, sterilising, commissioning and hand-over of new water piping installed on surface against walls or soffits, underground, in ceiling voids, chased or built into walls and/or in service ducts, including all necessary bends, tees, reducers, elbows, valves, strainers, adapters, brackets, hangers, etc, to hand over a complete and effective installation that complies with local government regulations.

The tendered rates shall also include full compensation for the supply and installation of hot-water pipe insulation and cladding.

The tendered rates shall also include full compensation for the necessary underground works such as excavation, pipe bedding, fill blanket, backfilling and compaction and for the reinstatement of existing surfaces such as floors, walls, ceilings, roads, paving, etc, as well as connection to the existing domestic water installation.

PAA.08 **SUPPLY AND INSTALLATION OF DOMESTIC GEYSER INSTALLATION INCLUDING SHUT-OFF VALVES, STRAINERS, DRIP TRAY, NON-RETURN VALVES, EXPANSION RELIEF VALVE, SAFETY VALVE, DRAIN PIPING AND ELECTRICAL CONNECTION:**……...Unit: number

The unit of measurement shall be the number of each geyser installation supplied and installed, including all associated pipe work, valves and fittings.

The tendered rate shall include full compensation for the supply and installation of domestic geysers, including shut-off valves, non-return valves, strainers, vacuum breakers, air release valves, safety valves, etc, as well as connection to existing piping and electrical supply.

PAA.09 **SUPPLY AND INSTALLATION OF FIRE WATER RETICULATION PIPEWORK**.....……. Unit: metre

The unit of measurement shall be the metre of each type of pipe work supplied and installed in the firewater reticulation, including all fixtures and fittings.

The tendered rate shall include full compensation for the supply, delivery, installation, testing, cleaning, commissioning and hand-over of new fire water reticulation pipe work installed on surface against walls or soffits and/or underground, including all necessary bends, tees, reducers, elbows, valves, adapters, brackets, hangers, pressure gauges, etc, to hand over a complete and effective installation that complies with local government regulations.

The tendered rates shall also include full compensation for the necessary underground work such as excavation, pipe bedding, fill blanket, backfilling and compaction and for the reinstatement of existing surfaces such as floors, walls, ceilings, roads, paving, etc, as well as connection to the existing fire water reticulation network.

PAA.10 **SERVICING, CLEANING AND REPAIR OF SANITARY WARE**..... ……..Unit: number

The unit of measurement shall be the number of each item of sanitary ware serviced, cleaned and repaired, including all associated pipe work and fittings.

The tendered rate shall include full compensation for the repair or replacement of all damaged or missing parts, servicing of all movable parts, cleaning of stained sanitary ware with approved cleaning agent, fixing of loose fixtures and brackets according to manufacturer's specifications, de-scaling and cleaning of cisterns and servicing of filling and flushing mechanisms, cleaning of all traps, fixing or replacing of damaged or missing shower, urinal and channel outlet gratings and any other work or action required to hand over an effective system that complies with local government regulations.

PAA.11 **SERVICING, OVERHAULING AND CLEANING OF BRASSWARE** ....…… Unit: number

The unit of measurement shall be the number of each item of brassware serviced, overhauled or cleaned, including all associated pipe work and fittings.

The tendered rate shall include full compensation for dismantling, cleaning and de-scaling, replacement of all gaskets, gland packing and seals on all valves, repair or replacement of all damaged or missing parts, replacement kits for worn or leaking flush valves, taps and mixers, repair or replacement of leaking, corroded or damaged flush pipes, readjusting of timing mechanisms on flush valves and metering taps and any other work or action required to hand over an effective system that complies with local government regulations.

PAA.12 **SERVICING, CLEANING AND REPAIR OF DOMESTIC WATER AND DRAINAGE PIPE INSTALLATIONS**…….. Unit: number, metre, item

The unit of measurement shall be the metre of each type of pipe installation serviced, cleaned and repaired, including all fixtures and fittings.

The tendered rates shall include full compensation for inspection, sampling testing, servicing, cleaning and repair of existing piping and equipment such as:

(a) Video surveying of all underground drainage pipe work to establish root ingress, damaged and corroded pipe work, fat build-up, blockages, incorrect falls, sagging and to provide as-built information;

(b) Initial unblocking and cleaning of all drainage pipe work, traps, floor drains and gullies;

(c) Pressure testing of piping and taking of water piping samples to determine state of corrosion and scaling;

(d) Repair work to damaged manholes, gullies, cleaning eyes, valve chambers, etc, including builders' work and benching;

(e) Repair of existing bracketing systems including fixing and repair of existing brackets and hangers, as well as the supply and installation of additional brackets where required;

(f) Emptying, cleaning, checking, testing and repair of oil and grease separators;

(g) Service and repair to all valves, strainers, pressure-reducing valves, water meters, non-return valves, air release valves and vacuum breakers, including new gaskets, gland packing and seals;

(h) Taking of water samples and bacteriological testing to determine the compliance with the relevant codes of practice;

(i) Repairing and/or replacement of damaged hot-water pipe lagging and cladding;

(j) Preparation, painting and repainting of pipe work and;

(k) Any other work or action to hand over an effective installation that complies with local government regulations.

PAA.13 **SERVICING, CLEANING AND REPAIR OF DOMESTIC GEYSERS**..... ……..……... Unit: number

The unit of measurement shall be the number of domestic geysers serviced, cleaned and repaired, including all fixtures and fittings.

The tendered rate shall include full compensation for the isolation, servicing, cleaning and repair of domestic geysers in accordance with the manufacturer's specifications, including de-scaling, testing for leaks, replacing of elements, replacement of safety valve and replacement of thermostat and set point, and replacement of connections if required and any other work or action to hand over an effective system that complies with local government regulations.

PAA.14 **SERVICING AND REPAIR OF FIRE WATER PIPED RETICULATION NETWORKS** ..... ……..… Unit: metre

The unit of measurement shall be the metre of each type of piping in the firewater network serviced and repaired, including all fixtures and fittings.
The tendered rates shall include full compensation for the inspection, testing, servicing and repair of existing piping and equipment such as:

(a) Pressure testing of piping and taking of pipe samples to determine the extent of corrosion and scaling;

(b) Repair or replacement of damaged, leaking, broken and corroded pipe work or fittings;

(c) Repair and service to all valves, including new gaskets, gland packing and seals;

(d) Repair, service, adjustment and calibration of all pressure gauges;

(e) Repair and fixing of existing brackets and hangers and the installation of additional brackets and hangers where required;

(f) Any other work or action to hand over an effective system that complies with local government regulations.

PAA.15 **CLEANING OUT SEPTIC TANKS AND DISPOSE OF CONTENTS OFF-SITE** ……. Unit: number

The unit of measurement shall be the number of septic tanks thoroughly cleaned and pumping the waste into a tanker and disposing of all the waste off site at a wastewater dumping area.

PAA.16 **SUPPLY AND INSTALLATION OF INDUSTRIAL GEYSER INSTALLATION**.....……...Unit: number

The unit of measurement shall be the number of each geyser installation supplied and installed, including all associated pipe work and fittings.

The tendered rates shall include full compensation for the supply and installation of industrial geyser installations including isolating lever-ball valves (from 22 to 50mm), 400 kPa expansion relief valve, drain connection, overflow pipe, inline circulating pump (25mm), Temperature and pressure safety valve, electrical control panel, bulk hot water vessel, pump supply cable, dual thermostat, hot water outlet, y-strainer, pressure gauge, non-return valve, temperature gauge, balanced cold water and expansion valve stand pipe.

PAA.17 **SERVICING, CLEANING AND REPAIR OF INDUSTRIAL GEYSERS**.. ……..……... Unit: number

The unit of measurement shall be the number of industrial geysers serviced, cleaned and repaired, including all fixtures and fittings.

The tendered rate shall include full compensation for the isolation, servicing, cleaning and repair of industrial geysers in accordance with the manufacturer's specifications, including de-scaling, testing for leaks, servicing, checking or replacing of isolating lever-ball valves (from 22 to 50mm), 400kPa expansion relief valve, drain connection, overflow pipe, inline circulating pump (25mm), Temperature and pressure safety valve, electrical control panel, dual thermostat, y-strainer, pressure gauge, non-return valve, temperature gauge, and any other work or action to hand over an effective system that complies with local government regulations.

PAA.18 **RE-INSTALLATION OF EXISTING GEYSER INSTALLATIONS AT LOCATION INDICATED BY ENGINEER**..... ……..Unit: number

The unit of measurement shall be the number of each geyser re-installed including associated pipe work and fittings.

The tendered rates shall include full compensation for the re-installation of the isolated domestic geysers, including servicing, cleaning and repair of domestic geysers in accordance with the manufacturer's specifications scaling, testing for leaks, replacing of elements, and replacement of thermostat and set point, replacement of two shut-off valves, non-return valve, strainer, two vacuum breakers, safety valve and replacement pipe work not exceeding 10m from the previous location according to SANS specifications and any other work or action to hand over an effective system that complies with local government regulations.

PAA.19 **SUPPLY AND INSTALLATION OF DOMESTIC GALVANISED GEYSER DRIP TRAY**……...Unit: number

The unit of measurement shall be the number of each geyser drip tray installation supplied and installed, including isolation and re-installation of geyser.

The tendered rates shall include full compensation for the supply and installation of the geyser drip trays including isolation of geyser and re-installation of geyser on drip tray.

PAA 07 DETAILS OF MAINTENANCE WORK

PAA 07.01 GENERAL

The Contractor shall be responsible for the complete maintenance of all the equipment, components, installations and systems forming part of this servicing and maintenance contract and as set out in PAA 03.05. The Contractor shall strictly adhere to Additional Specification SA: General Maintenance, and Technical Specification AA: Plumbing and Drainage Installations, with regard to the maintenance period, obligations, responsibilities, actions and activities, etc, which shall also include the following maintenance actions:

(a) Routine preventative maintenance. A guideline to the required actions is provided in specification AA. The actions will not be limited to these guidelines, but shall include all additional actions, work, materials, etc. necessary to maintain this installation at an acceptable level.

(b) Corrective maintenance as described and defined in Additional Specification SA: General Maintenance.

(c) Breakdown maintenance as described and defined in Additional Specification SA: General Maintenance.

Emergency breakdown shall be defined as any equipment, components and systems preventing the provision of water and the drainage of the equipment to the consumer points due to a failure of part of this system at the particular point of incident.

TECHNICAL SPECIFICATION

AB BUILDING ELECTRICAL INSTALLATIONS

CONTENTS

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AB 01 SCOPE

AB 01.01 This specification comprises all aspects regarding the maintenance and servicing of building electrical systems. Building electrical systems comprise:

(i) Distribution boards and low voltage cable
(ii) Interior and exterior lighting of buildings
(iii) Small power and fixed appliances
(iv) Earthing and lightning protection system

AB 01.02 This specification shall form an integral part of the maintenance and servicing contract document and shall be read in conjunction with portion 3, the Additional Specifications included with this document.

AB 02 STANDARD SPECIFICATIONS, REGULATIONS AND CODES

AB 02.01 The latest edition, including all amendments up to date of tender of the following specifications, publication and codes of practice shall be read in conjunction with this specification and shall be deemed to form part thereof.

AB 02.02 SANS Specifications

General	Distribution and meter boards	LV cables and conductors	Lighting system	Earthing and lightning protection system	Small power installation	
					Power outlets	Conduits, powerskirting, cable trays and ducting
SANS 10142	SANS 152		SANS 10114	SANS 03	SANS 152	SANS 950
SANS 10160	SANS 156	SANS 10198	SANS 163	SANS 10199	SANS 164	SANS 1065
SANS 10400	SANS 172	SANS 1411	SANS 1012		SANS 1084	SANS 1085
SANS 1222		SANS 1507	SANS 1084		SANS 1239	
			SANS 1250			
			SANS 1279			
			SANS 1777			
			SANS 10114			

AB 02.03 Department of Public Works Specifications PW 774 and PW 343.

AB 02.04 Occupational Health and Safety Act

The Contractor shall be required to comply with the Occupational Health and Safety Act 85 of 1993, Construction Regulations 2014 and related regulations. Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

AB 02.05 Manufacturer's specifications and installation instructions.

AB 02.06 Additional requirements

Equipment and material installed shall be new and unused.
Luminaires, control gear, isolators and power outlets shall bear the SANS stamp. The Contractor shall ensure that all safety regulations and measures are applied and enforced during repair and maintenance work on cabling, wiring, distribution boards, luminaires, power points and fixed appliances.

AB 03 OPERATING AND MAINTENANCE MANUALS

AB 03.01 No operating and maintenance manuals shall be developed for this section.

The contractor shall use the maintenance control plan to schedule preventative maintenance actions.

AB 04 TESTS AND INSPECTIONS

AB 04.01 All systems are to be re-checked by the Contractor prior to re-commissioning. Copies of all checks for each installation shall be presented to the Engineer for approval before re-commissioning takes place.

AB 04.02 It is the responsibility of the Contractor to provide all labour, accessories and properly calibrated and certified measuring instruments necessary to record the following parameters:

AB 04.02.01 continuity of ring final circuit conductors
AB 04.02.02 continuity of protective conductors, including main and supplementary equipotential bonding

AB 04.02.03 earth electrode resistance
AB 04.02.04 insulation resistance
AB 04.02.05 polarity
AB 04.02.06 earth fault loop impedance
AB 04.02.07 operation of residual current devices
AB 04.02.08 phase voltage
AB 04.02.09 current per phase
AB 04.02.10 illumination levels in lux

AB 04.03 The Contractor is responsible for the arrangement of such tests. He shall give at least 72 hours notice to the Engineer prior to the test date.

AB 05 LOGGING AND RECORDING PROCEDURES

AB 05.01 The Contractor shall as part of this Contract institute a Recording system as part of his Maintenance Control Plan as defined in the Additional Specification SA – General Maintenance. This shall consist of a Record book which shall be utilised to log and record all faults, system checks, breakdowns, maintenance visits, inspections etc.

AB 05.02 The logbook shall be stored in a safe place and shall only be utilised by the Contractor and Engineer. A copy of the monthly entries and recordings into this logbook shall be submitted by the Contractor together with his monthly report to the Engineer.

This logbook shall be structured to at least include the following:

AB 05.02.01 Bi-annual inspection and testing of all systems.
AB 05.02.02 Monthly lamp inspection and maintenance actions.
AB 05.02.03 Annual earthing test report.
AB 05.02.04 Bi-annual inspection and testing of distribution boards.

AB 06 MAINTENANCE TOOLS AND SPARES

AB 06.01 On commencement of the Maintenance and Servicing Contract, the Contractor shall supply and deliver certain Tools and Spares to the User Client. These tools and spares will be the property of the Department of Public Works. Any deficiencies or short fall or damaged Tools and Spares during the contract shall be replaced with new equipment / material.

AB 06.02 The Tools and Spares shall be kept safe in a lockable store room on site. The Contractor shall provide his own lock for the designated store room. The inventory of the Tools and Spares shall be verified on a monthly basis. Any short fall shall be replaced by the Contractor as part of his responsibility under this contract.

AB 06.03 The Tools and Spares shall at least include the following:

20 off PL 9W lamps
20 off 36W fluorescent lamps
40 off 58W fluorescent lamps
2 off 250W HPS lamps
2 off 80W MV lamps
Distribution kiosk key
DB face plate square key
DB face plate triangular key

AB 06.04 Tools and Spares: Measurement and payment

Item		Unit
(a)	**Supply of Tools and Spares**	No

The unit of measurement shall be the number of Tools and Spares supplied.

The tendered rate shall include full compensation for the supply and delivery of the Tools and Spares as specified.

AB 07 QUALITY ASSURANCE SYSTEM

AB 07.01 Following formal approval of his Quality Assurance system by Engineer, the Contractor shall implement the approved QA system.

AB 07.02 Records of this QA system shall be kept throughout the duration of the contract and shall be submitted to the Engineer as required by the Department.

AB 08 RE-COMMISSIONING OF INSTALLATION

AB 08.01 On completion of the work, the contractor shall re-check and put all systems into operation.

AB 08.02 All commissioning shall be performed by the Contractor, to the satisfaction of the Engineer. The Contractor shall confirm in writing that all systems have been repaired according to specification and are fully operational.

AB 08.03 All installations shall be energised for a minimum continuous period of 96 hours immediately prior to the Engineer's Completion inspection to verify lamp stability and reliability of power reticulation

AB 09 LIGHTING INSTALLATION SYSTEM

AB 09.01 The various electrical systems shall be serviced during the first phase of the maintenance and servicing contract.

AB 09.02 The scope of the work shall include, but shall not be limited to the activities listed below.

AB 09.03 The Contractor shall record the repair actions in tabular format before the Contractor's responsibility for maintenance commences.

AB 10 INSTALLATION TECHNICAL DETAILS

AB 10.01 Installation description

Repair and maintenance work of the building electrical systems shall be categorised under the following installations:

AB 10.01.01 Glass House

- Old Glass House electrical panel to be replaced with modern and optimised panel.
- Electrical wiring and conducts that was seen rusted, damaged, and unsafe inside the Glass House will be replaced.
- Glass House lamination/ luminaires filled with water is unsafe and will be replaced with waterproof (IP65) light fittings.
- Electrical cables and e-stops related to fans to be replaced to ensure the safe operation of mechanical and electrical installations.

AB 10.01.02 Germination House

- Soil heater conduits that are rusted, and enclosing unsafe wiring will be replace complete with new cables.
- Cables going to soil heater isolators, controls and temperature regulators must be repair or replaced, depending on their condition.

AB 10.01.03 Mist House

- Mist House electricity panels that are not safe, rusted and filled with wasps to be repaired/replaced. Replacement of defective swichgear.
- Mist House panel controls that not functional to be replaced. This will include cables and conduits to and from soil heaters.

AB 10.02 Scope of work

AB 10.02.01 Distribution boards and cabling

(a) Service distribution boards: inspect and clean the distribution boards, treat the enclosure for moisture ingress and corrosion.

(b) Check for rigidity and fastening of equipment trays, panels, doors and handling devices.

(c) Check locking mechanism and fit padlock. All padlocks shall be of local manufacture with brass bodies and 75 mm chrome shackles. Three keys (with pvc labels) shall be provided for each lock.

(d) Replace damaged or missing faceplates, doors, mounting frames, handles, thumb catches, etc.

(e) Check operation of distribution board equipment and meters, replace if faulty or damaged with an approved type.

(f) Remove all obsolete equipment and meters.

(g) Check and fasten wiring and cable terminations.

(h) Re-arrange wiring and equipment to give a neat installation.

(i) Trace outgoing circuits.

(j) Fit labelling and blank face plate covers.

(k) Replace the distribution boards if required and replacement is approved by Engineer. Check earth bar and earth continuity, record.

(l) Label all wiring and cabling with Grafoplast Trasp PVC markers.

(m) Replace all circuit breakers that are rated below 5 kA.

AB 10.02.02 Lighting system

(a) Indoor luminaires

(i) Operational and complete luminaires

- Remove lamps and wash luminaire body with detergent. Clean polycarbonate diffusors with detergent. Clean polished pure aluminium diffusors / reflectors with benzene.

- Check condition of luminaire seal, entrance gland, lampholder and internal wiring.

- Ensure that earth stud and earth connection is sound.

- Replace missing screws, catches, bolts and plugs.

- Check condition of suspension cords of pendant luminaires.

- Re-lamp.

(ii) Damaged or incomplete luminaires

- Remove luminaire.
- Replace luminaire and reconnect.

- Fit new lamps.

(b) Light switches

Note: All light switches shall have steel faceplates with permanent glued Traffolite labels.

- Remove switch cover.

- Check continuity of earth connection.

- Check operation of switch and replace if suspect.

- Replace switch cover, fit new csk stainless steel screws if required.

(c) Photocells

- Wash translucent body with detergent.

- Cover photocell and verify operation.

- Check bypass manual switching circuit.

- Enclose all exposed wiring in 16 mm ø Sprague.

- Install photocell in a dummy bulkhead

(d) Floodlight and bulkhead luminaires

- Remove lens and lamp. Wash lens thoroughly.
- Wash luminaire body with detergent.
- Clean polished pure aluminium reflectors with benzene.
- Check condition of internal wiring, capacitor, ballasts and starters.
- Check condition of neoprene seal and replace if worn or damaged.
- Check condition of lampholder.
- Seal conduit and wiring entry with silicone to eliminate water ingress.
- Fit new lamp.
- Check condition of earth stud and luminaire earth connection.
- Replace all missing screws, lens catches, bolts.
- Close cover securely, check stirrup bolts.

SCHEDULE OF LUMINAIRES

TYPE	DESCRIPTION
A	43W IP65 SABS LED LUMINAIRE - BEKA VAPOURLINE TYPE : VLNLED 43N WITH WATERTIGHT DIFFUSER OR SIMILAR APPROVED
B	30W IP65 SABS LED LUMINAIRE - BEKA VAPOURLINE TYPE : VLNLED 30N WITH WATERTIGHT DIFFUSER OR SIMILAR APPROVED
C	13W LED BULKHEAD LUMINAIRE - BEKA TYPE SERIES 30 OR SIMILAR APPROVED
D	195W LED FLOOD LIGHT LUMINAIRE WITH IP-65 RATING SIMILAR OR EQUAL APPROVED TO BEKA OMNISTAR-ECO MC2081N5366A1GS STIRRUP MOUNTED

AB 10.02.03 Power outlets and fixed appliances

Note: All power outlets shall have steel faceplates with permanent glued Traffolite labels.

(a) Inspect all power outlets and verify earthing.

(b) Check contact points and tighten screws.

(c) Replace missing screws and covers for outlet and draw boxes.

(d) Replace missing, faulty or damaged socket outlets and plugs.

(e) Check conditions and operation of local isolators and control switches for fixed equipment and replace if faulty, damaged or missing.

(f) Check earthing of fixed appliances and test for earth continuity.

(g) Inspect cable and wireways.

(h) Check for rigidity and fastening of the cable ducts, ladders, ducting, powerskirting and surface conduiting, fasten or replace if loose or damaged, check earthing and test for earth continuity.

AB 10.02.04 Earthing, bonding and lightning protection

(a) Check earthing and bonding of outlet points, equipment, cable and wireways, fixed appliances, water and gas pipes, etc.

(b) Check installation and termination of protective conductors and earth electrodes

(c) Test for earth continuity.

(d) Provide 6 mm² copper earth wire jumper between roof cladding and all gutter downpipes. Fasten with lugs and galvanized zinc bolts. Typically ten downpipes per housing unit. Earth at least two gutter downpipes by means of 16 mm² green insulated earth wire connected to 1,2 m earth electrode by means of cadwelding. Typically two downpipes per 25 m long housing unit.

(e) Installation of 9.5 mm² aluminium roof conductor in galvanised conduit from the roof cladding against the building to the earth electrode.

AB 11 MEASUREMENT AND PAYMENT

AB.01 Distribution boards and cabling

Item	Unit
AB.01.01 Service distribution board	No

The unit of measurement shall be the number of distribution kiosks or boards opened and serviced as specified in Clause AB 10.02.

The tendered rate shall include full compensation for the opening of the distribution board or kiosk, internal cleaning of the enclosure, cleaning of equipment and meters, removal of obsolete distribution board equipment, re-arrangement of equipment and wiring, treatment of the enclosure for moisture ingress and corrosion, vermin protection, fastening and / or replacement of wiring, tracing of outgoing circuits, labelling of outgoing wiring and mcb's and cable terminations and earth testing.
The tendered sum shall further include for replacement of damaged, missing or faulty distribution board switchgear, meters, face plates, mounting frames, handling devices, doors, labelling with engraved Traffolite labels, neutral bars, earth bars etc. All downstream circuit breakers shall be rated at 6 kA fault level.

Item	Unit
AB.01.02 Replace distribution board	No

The unit of measurement shall be the number of distribution boards removed and replaced if replacement is approved by Engineer.

The tendered rate shall include full compensation for the dismantling of the DB equipment, removal of the dilapidated enclosure, supply and installation of an epoxy painted new enclosure, mounting frames, plates, equipment, meters, tracing of outgoing circuits, labelling etc.

The tendered sum shall further include for re-wiring of the board, cable termination, cable labelling, remedial builders work and earth testing.

Item	Unit
AB.01.03 Replace cabling	m

The unit of measurement shall be the linear length of cable supplied and installed.

The tendered rate shall include full compensation for the removal of the existing cabling; supply, handling, installation and termination of the specified type of cable.

This rate shall further include for the supply of all cable ties, clamps and other material necessary to ensure that the installation conforms to the specification.

Item	Unit
AB.01.04 Replace wiring	m

The unit of measurement shall be the linear length of conductors supplied and installed.

The tendered rate shall include full compensation for the removal of the existing conductors, the supply, handling, installation, pulling in conduit and termination of the specified type of conductor.

This rate shall further include for the supply of all cable ties, labelling, and other material necessary to ensure that the wiring conforms to the specification.

	Item	Unit
AB.01.05	**Jointing and termination of cables**	No

The unit of measurement shall be number of cable joints or terminations.

The tendered rate shall include full compensation for the cost for providing the kits, complete with compound, ferrules and cable lugs, the cost for cutting the cable, handling and fitting kits and the cost of testing the joints and terminations. Position of joints shall be indicated on as-built drawings

	Item	Unit
AB.01.06	**Supply and install padlocks**	No

The unit of measurement shall be number of padlocks supplied and installed.
The tendered rate shall include full compensation for the ordering, supply and installation of the 75 m locally manufactured padlocks and locking devices as well as fitting each of the three keys with purpose-made pvc labels.

	Item	Unit
AB.01.07	**Excavate in all materials for trenches, backfill, compact and dispose of surplus material**	m^3

The unit of measurement shall be the cubic meter of material excavated in trenches.

The tendered rate shall include full compensation for clearing and grubbing the trench areas, for excavating the trench, preparing the bottom of the trench, separating material unsuitable for backfill and dealing with any surface or subsurface water.

The tendered rate shall furthermore cover the cost of installing the sand bed and sand cover, backfilling, compacting and disposing of the surplus material.

	Item	Unit
AB.01.08	**Supply and install cable sleeves**	m

The unit of measurement shall be the linear length in meter of the cable sleeve supplied and installed.

The tendered rate shall include full compensation for the supply, delivery, handling and installing the specified sleeves including the all the required, couplings, steel draw wires and plugs.

	Item	Unit
AB.01.09	**Supply and install plastic warning tape**	m

The unit of measurement shall be the linear length in meter of the plastic warning tape supplied and installed.

The tendered rate shall include full compensation for the supply, handling and laying of the plastic warning tape.

	Item	Unit
AB.01.10	**Termination of the low voltage cable**	No

The unit of measurement shall be the number of low voltage cable terminations.

The tendered rate shall include full compensation for providing the cable glands and shrouds, the cost for handling, fitting and cutting the cable.

	Item	Unit
AB.01.11	**Supply and install earth continuity conductor**	m

The unit of measurement shall be the linear length in meter of the earth continuity conductor supplied and installed.

The tendered rate shall include full compensation for procuring, furnishing and laying the specified earth continuity conductor.

	Item	Unit
AB.01.12	**Termination and connect earth continuity conductor**	No

The unit of measurement shall be the number of earth continuity conductors terminated and connected.
The tendered rate shall include full compensation for supplying all the material required to terminate and connect the earth continuity conductors and the connecting thereof to the earth bars, including label tags.

	Item	Unit
AB.01.13	**Supply and installation of circuit breakers**	No

The unit of measurement shall be the number of circuit breakers supplied and installed.

The tendered rate shall include full compensation for the supply and installation of the specified type and size of circuit breaker, including printed PVC labelling.

	Item	Unit
AB.01.14	**Supply and installation of isolators**	No

The unit of measurement shall be the number of isolators supplied and installed.

The tendered rate shall include full compensation for the supply and installation of the specified isolator, including printed PVC labelling.

	Item	Unit
AB.01.15	**Supply and install contactors**	No

The unit of measurement shall be the number of contactors supplied and installed.

The tendered rate shall include full compensation for the supply and installation of the specified type of contactor, including engraved labelling on rear tray.

	Item	Unit
AB.01.16	**Supply and install switching timers**	No

The unit of measurement shall be the number of switching timers supplied and installed.

The tendered rate shall include full compensation for the supply and installation of the specified type of switching timer, including labelling.

	Item	Unit
AB.01.17	**Supply and install earth leakage units**	No

The unit of measurement shall be the number of earth leakage units supplied and installed.

The tendered rate shall include full compensation for the supply and installation of the specified type of earth leakage units, including labelling.

	Item	Unit
AB.01.18	**Supply and install fuses**	No

The unit of measurement shall be the number of fuses supplied and installed.

The tendered rate shall include full compensation for the supply and installation of the specified type of fuse, including engraved label indicating fuse rating.

	Item	Unit
AB.01.19	**Supply and install surge arrestors**	No

The unit of measurement shall be the number of surge arrestors supplied and installed.

The tendered rate shall include full compensation for the supply and installation of the specified type of surge arrestors, with visual indication.

	Item	Unit
AB.01.20	**Supply wire marker kit**	No

The unit of measurement shall be the number of specified wire marker kits supplied.

The tendered rate shall include full compensation for the procurement and delivery of the cable marker kit as specified.

	Item	Unit
AB.01.21	**Install distribution board**	No

The unit of measurement shall be the number of distribution boards removed and replaced with the new manufactured distribution Boards.

The tendered rate shall include full compensation for the dismantling of the DB equipment, removal of the dilapidated enclosure, supply and installation of an epoxy painted new enclosure, mounting frames, plates, equipment, meters, tracing of outgoing circuits. connection of all circuits, termination of circuits and cables, labelling etc.

The tendered sum shall further include for re-wiring of the board, cable termination, cable labelling, remedial builders work and earth testing.

AB.02 Lighting system

Item	Unit
AB.02.01 Re-lamp luminaire	No

The unit of measurement shall be the number of lamps replaced.

The tendered rate shall include full compensation for the supply and installation of the specified lamp according to the manufacturer's instructions. Replacement date must be written on lamp.

Item	Unit
AB.02.02 Service luminaire	No

The unit of measurement shall be the number of luminaires opened and serviced In accordance with Clause AB 10.02.

The tendered rate shall include full compensation for the servicing of the luminaire, including washing, checking of seals, glands, lamp holders, cleaning of diffusers, tightening of fixing screws and bolts, corrosion protection and the checking of earthing continuity and aiming angle if applicable. All external luminaire conduit entries are to be sealed with silicone, which cost is included in this payment item.

The tendered rate shall further include for replacement of the luminaires internal wiring where applicable and the tightening of all connections

Item	Unit
AB.02.03 Replace luminaire	No

The unit of measurement shall be the number of luminaires replaced.

The tendered rate shall include full compensation for the removal of the existing luminaire and for the supply and installation of the specified type of light fitting complete with lamp and control gear, according to manufacturer's instructions.

Item	Unit
AB.02.04 Replace light switch	No

The unit of measurement shall be the number of light switches replaced.

The tendered rate shall include full compensation for the removal of the existing light switch and for the supply and installation of the specified type of light switch to manufacturer's instructions. Light switch face plate shall be fitted with an engraved Traffolite label as per Nosa-standard, cost of, which is included in rate.

	Item	Unit
AB.02.05	**Replace photo-electric switch**	No

The unit of measurement shall be number of photocell units replaced.

The tendered rate shall include full compensation for the supply, connecting and testing of the switch.
The rate shall further include full compensation for the cost of providing and installing all hardware, screws, wall plugs, 16 mm ø sprague and other material required to install the photo electric light switch in accordance with the manufacturer's specification.

The tendered rate shall further compensate for the supply and installation of the photocell inside a dummy B10 bulkhead.

	Item	Unit
AB.02.06	**Replace luminaire diffuser or lens**	No

The unit of measurement shall be number of luminaire diffusers replaced.

The tendered rate shall include full compensation for the supply and installation of the specified type of diffuser, including fixing screws and clips.

	Item	Unit
AB.02.07	**Service light switch**	No

The unit of measurement shall be the number of light switches opened and serviced.

The tendered rate shall include full compensation for the servicing of the light switch, internal cleaning of the enclosure, spray painting, inspection of the contact points, switching mechanism, earthing, etc.

The tendered sum shall further include for replacement of any missing outlet covers and fixing screw and earth testing. Light switch face plate shall be fitted with an engraved Traffolite label as per Nosa-standard, cost of, which is included in rate.

	Item	Unit
AB.02.08	**Remove, clean, store and reinstallation of luminaire**	No

The unit of measurement shall be the number of light fittings removed, cleaned, stored and reinstalled.

The tendered rate shall include full compensation for the removal, disconnect, cleaning, storage (4 weeks) reinstallation, reconnection and testing of the luminaire.

The rate shall further include full compensation for the installation of 2 x 700 mm supporting timber members above the ceiling (114 x 38 Par SA Pine) and the mounting of 63 mm ø round conduit outlet box complete with 2 x 4 x 60 mm galvanised screws.

	Item	Unit
AB.02.09	**Replace Lamp Holder**	No

The unit of measurement shall be the number of lamp holders replaced.

The tendered rate shall include full compensation for the removal of the existing lamp holder and for the supply and installation of the specified type (ceramic) of lamp holder to the manufacturer's instructions.

	Item	Unit
AB.02.10	**Replace Luminaire internal components**	No

The unit of measurement shall be the number of SANS approved internal luminaire components replaced.

The tendered rate shall include full compensation for the removal of the defective component and for the supply, installation and testing of the specified type of component to the manufacturer's instructions.

AB.03 Small power and fixed appliances

	Item	Unit
AB.03.01	**Replace socket outlet**	No

The unit of measurement shall be the number of socket outlets replaced.

The tendered rate shall include full compensation for the removal of the existing socket outlet and the supply and installation of the specified type of socket outlet.

All socket outlets shall be supplied complete with cover plates and boxes where required. The tendered rate shall therefore include for the supply of the cover plates and fixing screws where applicable. Outlet face plate shall be fitted with an engraved, Traffolite label as per Nosa-standard, cost of, which is included in the rate.

	Item	Unit
AB.03.02	**Replace isolator**	No

The unit of measurement shall be the number of isolators supplied.

The tendered rate shall include full compensation for the supply and installation of the specified type of isolator or control unit.
The tendered sum shall further include for the provision of 4 wire, 3 phase connections to the fixed appliance. Isolator face plate shall be fitted with an engraved Traffolite label as per Nosa-standard, cost of, which is included in the rate.

	Item	Unit
AB.03.03	**Replace plug tops**	No

The unit of measurement shall be the number of plug tops replaced.

The tendered rate shall include full compensation for the supply and installation of the required type of plug top.

	Item	Unit
AB.03.04	**Replace conduit**	m

The unit of measurement shall be the linear meter of conduit supplied and installed. The tendered rate shall include full compensation for the supply and installation of the specified type and size of conduit, including all fixing accessories.

	Item	Unit
AB.03.05	**Replace wiring channel**	m

The unit of measurement shall be number of linear meter of wiring channel replaced.

The tendered rate shall include full compensation for the supply and installation of the specified type of wiring channel with 6 x 60 mm fasteners, including the cover and all the necessary accessories.

	Item	Unit
AB.03.06	**Supply and install connections to fixed appliances**	No

The unit of measurement shall be number of connections made.

The tendered rate shall include full compensation for the supply and installing of the connections to the fixed appliances.

The tendered rate shall include the installation of the flexible copex Sprague conduit and conductors from the isolator to the fixed appliance.

	Item	Unit
AB.03.07	**Service socket outlet**	No

The unit of measurement shall be the number of socket outlets opened and serviced.

The tendered rate shall include full compensation for the servicing of the socket outlet , internal cleaning of the enclosure, inspection of the contact points, switching mechanism, if applicable, earthing, etc. Outlet face plate shall be fitted with an engraved, Traffolite label as per Nosa-standard, cost of, which is included in the rate.

The tendered sum shall further include for replacement of any missing outlet covers and fixing screw and earth testing.

	Item	Unit
AB.03.08	**Service isolator**	No

The unit of measurement shall be the number of isolators opened and serviced.

The tendered rate shall include full compensation for the servicing of the isolator, internal cleaning of the enclosure, inspection of the contact points, switching mechanism, earthing and connections to the fixed appliance. Isolator face plate shall be fitted with an engraved Traffolite label as per Nosa-standard, cost of, which is included in the rate.

The tendered sum shall further include for replacement of any damaged or missing outlet covers and fixing screw, connections to appliances including earth continuity testing.

	Item	Unit
AB.03.09	**Replace power skirting**	m

The unit of measurement shall be the linear metre of power skirting supplied and installed.

The tendered rate shall include full compensation for the removal of the existing power skirting, the supply and installation of the specified type and size of powerskirting including all accessories.

	Item	Unit
AB.03.10	**Supply and install connection boxes**	No

The unit of measurement shall be the number of connection boxes supplied and installed.

The tendered rate shall include full compensation for the supply and installation of the specified type of Pratley box.

	Item	Unit
AB.03.11	**Supply and install draw boxes**	No

The unit of measurement shall be the number of draw boxes supplied and installed.

The tendered rate shall include full compensation for supplying and installing the draw boxes including cover plates where no equipment is installed in the box.

	Item	Unit
AB.03.12	**Supply and install draw box cover plates**	No

The unit of measurement shall be the number of draw box cover plates supplied and installed.

The tendered rate shall include full compensation for the supply and installation of the specified type and size of cover plates for draw boxes including the fixing screws.

	Item	Unit
AB.03.13	**Replace “stop-start” local control panel**	No

The unit of measurement shall be the number of “stop-start” local control panels supplied and replaced.

The tendered rate shall include full compensation for the supply and installation of “stop/start” local control panel including emergency stop button and 32A 3 pole contactor in an IP55 polycarbonate enclosure. The rate shall include an engraved Traffolite label indicating load and supply DB.

	Item	Unit
AB.03.14	**Test and service ceiling mounted fan**	No

The unit of measurement shall be the number of ceiling fans tested.

The tendered rate shall include full compensation for the servicing of the fan, disconnection, testing, inspection of the contact points, switching mechanism, earthing and re-connection of the ceiling fan.

	Item	Unit
AB.03.15	**Replace ceiling mounted fan**	No

The unit of measurement shall be the number of ceiling fans supplied and installed.

The tendered rate shall include full compensation for the disconnection of the damaged ceiling fan and for the supply, installation and connection of the new ceiling fan.

	Item	Unit
AB.03.16	**Service ceiling mounted fan control switch**	No

The unit of measurement shall be the number of control switches opened and serviced.

The tendered rate shall include full compensation for the servicing of the control switch, inspection of the contact points, switching mechanism, if applicable, earthing etc.

	Item	Unit
AB.03.17	**Replace ceiling mounted fan control switch**	No

The unit of measurement shall be the number of control switches replaced.

The tendered rate shall include full compensation for the supply and installation of the control switch.

The tendered sum shall further include for the provision of connection to the ceiling fan.

	Item	Unit
AB.03.18	**Replace domestic stove components**	No

The unit of measurement shall be the number of stove components.

The tendered rate shall include full compensation for the supply and installation of the specified component.

The rate shall further include the disconnection and removal of the faulty component and the installation and testing of the new component.

	Item	Unit
AB.03.19	**Replace geyser components**	No

The unit of measurement shall be the number of geyser components.
The tendered rate shall include full compensation for the supply and installation of the specified component.

The rate shall further include the disconnection and removal of the faulty component and the installation and testing of the new component.

The rate shall also include the draining of the water from the geyser and refilling before testing.

	Item	Unit
AB.03.20	**Supply and Install Stove**	No

The unit of measurement shall be the number of electrical four plate stoves with oven and warm drawer supplied and installed.

The tendered rate shall include full compensation for the supply and installation of the stove including connection and testing after approval of the Engineer.

	Item	Unit
AB.03.21	**Supply and Install Hob**	No

The unit of measurement shall be the number of electrical stainless steel 2 solid plate Hobs supplied and installed.

The tendered rate shall include full compensation for the supply and installation of the Hob including connection and testing after approval of the Engineer.

	Item	Unit
AB.03.22	**Provide Certificate of Compliance**	number

The unit of measurement shall be the number of Certificate of Compliance obtained from local authorities and issued to the Engineer for all the buildings under the installation.

The tendered rate shall include full compensation for the testing and all associated equipment to complete the Certificate of Compliance and certification thereof.

AB.04 **Earthing and bonding**

	Item	Unit
AB.04.01	**Supply and install earthing and bonding for the installation**	sum

The tendered lump sum shall include full compensation for the provision of all material required for the earthing and bonding of the installation in accordance with the specification.

	Item	Unit
AB.04.02	**Testing of the earth installation by a specialist contractor**	sum

The tendered lump sum shall include full compensation for the testing of the earth installation by a specialist contractor approved by the Engineer.

	Item	Unit
AB.04.03	**Supply and install earth electrodes**	No

The unit of measurement shall be the number of earth electrodes supplied and installed.

The tendered sum shall include full compensation for the supply and installation of the specified type and size of earth electrodes including termination by means of approved clamps.

	Item	Unit
AB.04.04	**Provide cadweld joint**	No

The unit of measurement shall be the number of cadweld joints provided.

The tendered sum shall include full compensation for the supply and installation of the specified type and size of cadweld pyro joints.

	Item	Unit
AB.04.05	**Earth building roof structure**	No

The unit of measurement shall be the number of roof structures earthed.

The tendered sum shall include full compensation for the supply and installation of the specified type and size of earthwire and the termination there off onto a 1,2 m Cu earth electrode driven into the soil 1,8 m deep.

AB.05 Inspection of Electrical Installation

	Item	Unit
AB.05.01	**Inspection of building general electrical installation**	sum

The unit of measurement shall be the sum for the building inspected prior to commencement of the repair work phase.

The tendered sum shall include the visual and functional inspection and testing of all lights, switches, small power points and fixed appliances, to determine the extent of repairs or replacements required.

The rate shall further include the preparation of a schedule of items (report) requiring repairs or replacement, for approval by the engineer.

TECHNICAL SPECIFICATION

BA ROOF COVERINGS

CONTENTS

BA 01 SCOPE
BA 02 STANDARD SPECIFICATIONS
BA 03 MEASUREMENT AND PAYMENT

BA 01 SCOPE

This specification covers the removal of existing roof coverings and waterproofing and the supply, delivery and installation of new roof coverings and water-proofing to various types of roofing, including:

- Iron sheeting of various types;
- Clay / concrete tiles;
- Concrete roofing;
- Thatch roofs, and
- Roofing slates.

Roof coverings shall mean the scope of work related to the removal of existing roof coverings, water-proofing and ancillary items, the supply and installation of new roof sheeting, roofing screws, purlins, flashings, rainwater goods, water-proofing, fascias and barge boards. This specification also includes minor work related to trusses, purlins, paintwork, minor plumbing work and water-proofing to concrete roofs.

BA 02 STANDARD SPECIFICATIONS

BA 02.1 GENERAL STANDARD SPECIFICATIONS

The latest edition, including all amendments to date of tender, of the following specifications, publications and codes of practice shall be read in conjunction with this specification and shall be deemed to form part thereof:

OW 371	-	Specification of Materials and Methods to be used
SANS 1200HB	-	Cladding and Sheeting
SANS 1783-4	-	Softwood brandering and battens
SANS 935	-	Hot-dip (galvanised) zinc coatings
SANS 1273	-	Fasteners for sheet roof and wall coverings
SANS 10407	-	Thatched roof construction

BA 02.2.1 ADDITIONAL SPECIFICATIONS

Technical Specification BB: Carpentry and Joinery for Roofs and Ceilings
Technical Specification BC: Waterproofing of Concrete Roofs

BA 02.2.2 OCCUPATIONAL HEALTH AND SAFETY ACT

The Contractor shall be required to comply with the Occupational Health and Safety Act 85 of 1993, Construction Regulations 2014 and related regulations. Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

BA 02.3 ADDITIONAL REQUIREMENTS FOR REPAIR OF PROFILED ROOF SHEETING (NON-CONCEALED FIXING AND CONCEALED FIXING)

BA 02.3.1 Roof sheeting

Existing roof sheeting shall either be replaced or to a small extent be repaired according to the Schedule of Quantities and as instructed by the Engineer. Where new sheeting is specified, the existing roof sheeting must be removed. Each day's removed sheeting shall be fully covered with new roof sheeting at the end of the day. Plastic sheeting or equivalent approved protection to minimize damage possibilities due to rain, etc. and to protect the personnel and occuplied buildings. The new roof sheeting shall be 0,6 mm thick galvanised (or Chromadek) IBR or equivalent approved for roof slopes exceeding 15º. Concealed fixed type Chromadek roof sheeting will in general be used to cover roofs with slopes not exceeding 15º. The sheeting must be laid in long lengths without end overlaps. The broad flutes must be turned up at the apex to form a dam, and turned down at the eaves to form a drip. Metal closers 0,8 mm thick galvanised (or Chromadek), complete with polyclosers set in one run of silicone sealant, are required at apexes, ridges, side and head walls, etc. The Contractor shall take all necessary dimensions and measurements on site prior to manufacturing and installation. Z275 galvanising spelter shall be used and the Contractor shall provide SANS certificates of compliance to the Engineer. Various standard dark colours will be used for Chromadek finished roof sheeting, flashings, gutters and down pipes. In all cases the roofing must be laid strictly in accordance with the manufacturer's specifications.

In certain cases, existing roof sheeting that is removed from buildings, will be re-used to repair similar types of structures.

The following paragraphs in specification OW 371 must be specifically read in conjunction with this technical specification:

Paragraph 7.6, excluding 7.6.1(i), 7.6.2(a) and 7.6.2(e)
Paragraph 7.7, excluding 7.7.1, 7.7.5 and 7.19.1(a).

BA 02.3.2 **Main fasteners to timber purlins: Galvanised/Chromadek IBR or equivalent approved sheeting**

90 mm x no. 14 hexagon head (H/H) carbon steel (C/S) cadmium plated Posidriv or equivalent approved roofing screws with 29 mm diameter x 1,0 mm thick galvanised conical washers and poly-isobutyl grommet assembly must be used. Main fasteners for steel purlins are to be 65 mm long. Fasteners to be provided at alternating ribs and all side laps.

BA 02.3.3 **Side lap fasteners: Galvanised/Chromadek IBR or equivalent approved sheeting**

Stitching will be done with 25 mm x no. 14 H/H C/S Posidriv or equivalent approved roofing screws @ 600 c/c maximum with 29 mm diameter x 1,0 mm thick galvanised conical washers and poly-isobutyl grommet assembly. Provide 10 x 1,6 mm thick butyl rubber sealer strip between sheets.

BA 02.3.4 **Flashings**

0,8 mm thick Chromadek/galvanised flashings at ridge caps, side and head walls, drips, corners, etc, as described elsewhere. The minimum length of an overlap between flashings is 150 mm. Apply two runs of silicone sealant between flashings. Flashings to be stitched together with 25 mm x no. 14 H/H C/S Posidriv or equivalent approved roofing screws with 29 mm diameter x 1,0 mm thick galvanised conical washers at end laps and longitudinally @ 400 c/c maximum at ribs, etc. The Contractor shall take all necessary dimensions and measurements on site prior to manufacturing and installation.

BA 02.3.5 **Sealant**

Silicone sealant with an amine cure system with primer shall be used to waterproof all flashings and rainwater goods, viz. gutters and down pipes. Two runs of silicone shall be provided at end overlaps.

BA 02.3.6 **Pipe flashings**

Dektite or equivalent approved pipe flashings shall be used to waterproof pipe protrusions through the roof sheeting. Installation shall be done strictly in accordance with the manufacturer's specification and shall include the application of Dektite silicone sealant and fastening of flashing to surface with TEKS or equivalent approved self-drilling fasteners.

BA 02.3.7 **Insulation**

No insulation repairs are required. In certain cases insulation may be necessary to reduce heat load or to comply with hygiene requirements as in abattoirs. Refer to section 7 part 7.6.3 of OW 371.
Specification for non-visible roof insulation material:

Super Sisalation 420 RSA or equivalent approved reinforced reflective aluminium foil (heavy grade) laid on 1,6 mm diameter galvanised straining wires at 300 mm centres to

the manufacturer's specification. The insulation shall be laid longitudinally over the purlins and lapped 150 mm at joints.
Specification for visible roof insulation material:
White Alucushion (code 2906) or equivalent approved white bubble foil on Aluminium foil backing laid on 1,6 mm diameter white plastic (PVC) coated straining wires at 383 mm centres to the manufacturer's specification. The insulation shall be laid longitudinally over the purlins and lapped at joints.

BA 02.4 ADDITIONAL REQUIREMENTS FOR REPAIR OF PROFILED SIDE WALL CLADDING (NON-CONCEALED FIXING AND CONCEALED FIXING)

BA 02.4.1 Side wall cladding

Existing side wall cladding shall either be repaired or replaced in accordance with the Schedule of Quantities. Where new cladding is specified, the existing side wall cladding must be removed. Each day's removed cladding shall be fully covered with new cladding at the end of the day. The new side wall cladding shall be 0,6 mm thick galvanised (or Chromadek) IBR or equivalent approved. The cladding must be laid in long lengths without end overlaps. Metal closers 0,8 mm thick galvanised (or Chromadek), complete with polyclosers set in one run of silicone sealant, are required at gables, ridges, side and head walls, etc. The Contractor shall take all necessary dimensions and measurements on site prior to manufacturing and installation. Z275 galvanising spelter shall be used and the Contractor shall provide SANS certificates of compliance to the Engineer. Heavy duty profiled polycarbonate sheets shall be used for translucent sheeting. Various standard dark colours for Chromadek finished side wall cladding, flashings, gutters and down pipes will be used. In all cases the cladding must be laid strictly in accordance with the manufacturer's specifications.

BA 02.4.2 Main fasteners to timber girts: Galvanised/Chromadek IBR (or equivalent approved) and profiled translucent sheeting

90 mm x no. 14 hexagon head (H/H) carbon steel (C/S) cadmium plated Posidriv or equivalent approved roofing screws with 29 mm diameter x 1,0 mm thick galvanised conical washers and poly-isobutyl grommet assembly must be used. Main fasteners for steel girts are to be 65 mm long. Fasteners to be provided at alternating ribs.

BA 02.4.3 Side lap fasteners: Galvanised/Chromadek IBR (or equivalent approved) sheeting

Stitching will be done with 25 mm x no. 14 H/H C/S Posidriv or equivalent approved roofing screws @ 600 c/c with 29 mm diameter x 1,0 mm thick galvanised conical washers and poly-isobutyl grommet assembly. Provide 10 x 1,6 mm butyl rubber sealer strip between sheets.

BA 02.4.4 End overlaps

If unavoidable, the end overlap shall be 300 mm minimum between sheeting and sealed with two rows of silicone sealant between the sheets. Bolt the ribs in the overlap region

with the profiled (polycarbonate) translucent sheeting with galvanised no. 14 gutter bolts, bonded washers and nuts through every alternative rib.

BA 02.4.5 **Side overlaps: Vertical profiled translucent sheeting**

Stitching will be done with 6 mm cadmium-plated cladding bolts and nuts x 25 mm long @ ± 300 c/c with 19 mm diameter x 1,0 mm thick galvanised conical washers and poly-isobutyl grommet assembly.

BA 02.5 **ADDITIONAL REQUIREMENTS FOR THE REPAIR OF THATCHED ROOFS**

BA 02.5.1 **Preparation** (Refer to Thatch Guide, CSIR 1998)

Cleaning and bundling

After the grass has been cut and loosely bundled, each bundle is shaken vigorously to dislodge all loose material. The bundles are then cleaned by passing a sickle through them, working from top to bottom. This removes the remaining leaf growth from the lower two thirds of the stalks. The grass is then regrouped into bundles about 1,0 - 1,5 m long and between 75 and 100 mm in diameter. These bundles are each tied with a thong of twisted grass or with twine and packed in heaps (pyramid shape) about 2 m high and 2.5 to 3 m in diameter at the base.

Combing

When the thatch is to be used for the “spray layer” (or what is commonly referred to as the *spreilaag*), immediately above the thatching battens, where the underside will often be exposed in a room, the material should be combed to ensure that the stalks are perfectly clean. A comb is made by driving a few 75 mm x 3.5 mm round wire nails into a horizontal pole, about 300 mm long. The nails are spaced about 12 mm apart, in a straight line. The bundles of grass are placed across the top of the comb and pressed down so that the stalks are separated by the nails. The bundle is then pulled through the comb from the top to the bottom end.

Storing

After combing, the bundles should be stacked clear of the ground and under cover. Bundles are normally baled for transport, in batches of 10 to 20 bundles for manual handling and 500 bundles for mechanical handling.

BA 02.5.2 **Chicken mesh protection**

To protect thatch roofing against damages caused by baboons, monkeys, birds, etc. a single layer of chicken mesh shall be placed over the finished thatch. Where the ridge has been removed, the chicken mesh shall be placed before the new ridge is placed. Otherwise, chicken mesh shall be laid over the ridge.

Sheets of mesh shall be placed vertically. Edges shall be tied together using binding wire. Chicken mesh shall be laid to cover the lower thatch edges and shall be tensioned using binging wire nailed to trusses underneath the roofing edge.

BA 02.6 ADDITIONAL REQUIREMENTS FOR THE REPAIR OF SLATE TILE ROOFS

BA 02.6.1 General

Slate tile roofs shall be handled according to the specifications in OW 371: Specification of Materials and Methods to be used, together with these additional requirements. It is a specific requirement that the slate roofing be performed by a slate roofing specialist.
When required, slate tiles shall be carefully removed and stored for re-use. Care shall be taken to not damage tiles during the process. Additional tiles required shall be matched to the existing tiles as closely as possible and approved by the Engineer before being placed.

BA 02.6.2 Waterproofing

The waterproofing membrane used under slate tiles shall be a three-layer laminate, consisting of a waterproof upper layer, a polypropylene interlayer and a anthracite bottom layer. The waterproofing shall be nailed to the rafters. Battens shall be placed on top of the waterproofing membrane.

Waterproofing shall be covered by tiles as soon as possible after being laid to prevent damage from exposure to the elements.

BA 02.6.3 Tile laying

Slates are to be laid in double thickness, with a headlap of 75 mm. Firstly an under-eave slate is nailed to the first (or tilting) batten, with the head of the slate resting on the second batten, and with a 50 mm overhang into the gutter. Full slates are then centre-nailed to the second batten, and thereafter proceed upwards to the ridge. Slates are to be laid to straight lines horizontally and vertically, in broken bond.

BA 02.6.4 Tile nailing

Tile nailing shall be performed as specified in OW 371, with the additional requirement that nailing holes shall be drilled, not punched.

BA 02.7 RAINWATER GOODS

BA 02.7.1 Gutters

Standard size for houses:
100 x 75 x 0,8 thick standard Chromadek/galvanised non-supporting beaded gutter. Galvanised brackets are to be provided at every truss. Brackets are to be painted to specification in the Schedule of Quantities.

Alternatively standard 140 x 127 x 83 x 0,6 mm thick Brownbuilt or equivalent approved Chromadek/galvanised fascia gutter with galvanised gutter clips can be used.

Typical size for other buildings:
125 x 100 x 0,8 thick standard Chromadek self-supporting beaded gutter.

Dark colours to Consultant's specification.

The following paragraphs in specification OW 371 must be read in conjunction with this technical specification:
7.15, 16.12 and 16.13.

The Contractor shall take all necessary dimensions and measurements on site prior to manufacturing and installation.

BA 02.7.2 **Joints in gutters, valleys, etc**

150 mm overlap sealed with an approved silicone and riveted together with 2 rows of sealed pop rivets. Linings to valleys and secret gutters, etc, shall have an overlap of 225 mm.

BA 02.7.3 **Gutter accessories and ancillary items**

End stops: 0,8 mm thick Chromadek/galvanised finished end stops joined to gutter on site and sealed as for joints in gutters.

Outlets: 0,8 mm thick Chromadek/galvanised finished outlets fixed to gutter with pop rivets and sealed with an approved silicone. Outlet to slip into down pipe.

Fascia straps: 25 mm wide x 1,0 mm thick galvanised straps at +/- 686 mm c/c.

Corner joints: Corner joints to be neatly mitred, pop riveted together and sealed with an approved silicone.

Sealant: Clear silicone sealant with amine cured system and primer shall be used to waterproof gutters and down pipes.

BA 02.7.4 **Down pipes**

Standard sizes:
100 x 75 x 0,6 thick Chromadek/galvanised down pipes
100 x 100 x 0,8 thick Chromadek/galvanised down pipes

Dark colours to Consultant's specifications.

Down pipes to have double-seamed joints. Down pipes, shoes, offsets, etc, shall be joined together by means of 100 mm slip joints and pop riveted together.

The Contractor shall take all necessary dimensions and measurements on site prior to manufacturing and installation.

BA 02.7.5 Down pipe accessories

Brackets: Standard galvanised brackets shall be spaced at centres not exceeding 2,4 metres.

Brackets to be primed and painted with 2 coats of high gloss enamel.

Shoes, offsets and spreaders: Manufactured from 0,8 mm thick Chromadek/galvanised material, cut and mitred to suit. All joints to be sealed with an approved silicone sealant.

BA.02.7.6 General

The Contractor will be responsible for the stability of the supporting structure during and after removal of existing roof cladding and sheeting.

SANS 1200 HB "Cladding and Sheeting" will be applicable for the erection of all new roofs.

The Contractor must give a minimum 3 year guarantee for the watertight roof and workmanship. **The manufacturer must carry out inspections at regular intervals during the construction period. He must issue a certificate of acceptance and compliance on completion to the client.**

BA 03 MEASUREMENT AND PAYMENT

BA.03.1 DETAILS OF MATERIAL TO BE USED

For detail descriptions of materials, thicknesses, dimensions and ancillary items to be used, as specified in the various payment items of roof sheeting, cladding, flashings, etc; refer to the scheduled list below:

Flashings: Refer to Technical Specifications BA	
Roof:	
0,8 mm thick Chromadek Ridge Flashing	462 mm girth (231 + 231), 3 x bends (2 are shallow bends). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone; 2 rows of broad flute polyclosers bedded in silicone, 2 rows x 0,6 mm thick Chromadek broad flute metal closers. Bend up trough to form a dam.
0,8 mm thick	462 mm girth (231 + 231), 3 x bends (2 are shallow bends). Fix flashing to roof

Galvanised Ridge Flashing	sheeting with Posidriv screws and washers. 150 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone; 2 rows of broad flute polyclosers bedded in silicone, 2 rows x 0,6 mm thick Galvanised broad flute metal closers. Bend up trough to form a dam.
0,6 mm thick Chromadek Eaves Closer	Fix standard serrated narrow flute eaves closer to timber purlin. Patch plaster and touch up paint work.
0,8 mm thick Chromadek Apex Trim	462 mm girth (231 + 231 vertical), 3 x bends (2 are shallow bends). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row of broad flute polycloser bedded in silicone, 2 rows x 0,6 mm thick Chromadek broad flute metal closers. Bend up trough to form a dam.
0,8 mm thick Galvanised Apex Trim	462 mm girth (231 + 231 vertical), 3 x bends (2 are shallow bends). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row of broad flute polycloser bedded in silicone, 2 rows x 0,6 mm thick galvanised broad flute metal closers. Bend up trough to form a dam.
0,8 mm thick Chromadek Headwall Flashing	385 mm girth (231 + 154 vertical) headwall flashing, 2 x bends (1 is a shallow bend). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row of broad flute polycloser bedded in silicone, 1 row x 0,6 mm thick Chromadek broad flute metal closer. Bend up trough to form a dam. 154 mm girth (114 + 25 + 15 lip @ 15º) Chromadek counter flashing, 3 x bends (1 is a shallow bend). Counter flashing to overlap with headwall flashing with at least 75 mm. Cut 6 mm wide groove into brick wall for counter flashing. Prime joint and seal with an approved 6 x 6 mm poly-urethane sealant.
0,8 mm thick Galvanised Headwall Flashing	385 mm girth (231 + 154 vertical) headwall flashing, 2 x bends (1 is a shallow bend). Fix flashing to roof sheeting with Posidriv and washers. 150 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row of broad flute polycloser bedded in silicone, 1 row x 0,6 mm thick Galvanised broad flute metal closer. Bend up trough to form a dam. 154 mm girth (114 + 25 + 15 lip @ 15º) galvanised counter flashing, 3 x bends (1 is a shallow bend). Counter flashing to overlap with headwall flashing with at least 75 mm. Cut 6 mm wide groove into brick wall for counter flashing. Prime joint and seal with an approved 6 x 6 mm poly-urethane sealant.
Extra over for cutting into brick wall	6 mm wide groove x 30 mm deep into brick wall. Clean groove from dust and prime groove.
0,8 mm thick Chromadek Hip Flashing	462 mm girth (231 + 231), 3 x bends (2 are shallow bends). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone. 2 rows of broad flute polyclosers bedded in silicone, 2 rows x 0,6 mm thick Chromadek broad flute metal closers on rake. Bend up trough to form a dam.
0,8 mm thick Galvanised Hip Flashing	462 mm girth (231 + 231), 3 x bends (2 are shallow bends). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone. 2 rows of broad flute polyclosers bedded in silicone, 2 rows x 0,6 mm thick Chromadek broad flute metal closers on rake. Bend up trough to form a dam.

0,8 mm thick Chromadek Apron Flashing	462* mm girth (308 + 154* vertical, girt position determines final upstand length on site), 3 x bends (2 are shallow bends). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone. 2 rows of broad flute polyclosers bedded in silicone, 1 row x 0,6 mm thick Chromadek broad flute metal closer. Bend up trough to form a dam.
0,8 mm thick Galvanised Apron Flashing	462* mm girth (308 + 154* vertical, girt position determines final upstand length on site), 3 x bends (2 are shallow bends). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone. 2 rows of broad flute polyclosers bedded in silicone, 1 row x 0,6 mm thick Galvanised broad flute metal closer. Bend up trough to form a dam.
0,8 mm thick Chromadek Eaves Flashing	462* mm girth (154 vertical + 308*, girt position determines final upstand length), 3 x bends (2 are shallow bends). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row each of broad and narrow flute polyclosers bedded in silicone, 1 row each x 0,6 mm thick Chromadek broad and narrow flute metal closers. Turn down trough to form a drip. Overhang length of roof sheeting to be determined on site.
0,8 mm thick Galvanised Eaves Flashing	462* mm girth (154 vertical + 308*, girt position determines final upstand length), 3 x bends (2 are shallow bends). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row each of broad and narrow flute polyclosers bedded in silicone, 1 row each x 0,6 mm thick galvanised broad and narrow flute metal closers. Turn down trough to form a drip. Overhang length of roof sheeting to be determined on site.
0,8 mm thick Chromadek Gable Flashing (residential type)	308 mm girth (262 + 46 vertical), 3 x bends (2 are shallow bends). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone. Flashing to be fitted tightly over gable fascia board. Provide one row of continuous silicone on rib.
0,8 mm thick Galvanised Gable Flashing (residential type)	308 mm girth (262 + 46 vertical), 3 x bends (2 are shallow bends). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone. Flashing to be fitted tightly over gable fascia board. Provide one row of continuous silicone on rib.
0,8 mm thick Chromadek Gable Flashing (industrial type)	462 mm girth (262 +200 vertical), 3 x bends (2 are shallow bends). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row x 0,6 mm thick Chromadek broad flute metal closer on side wall cladding. Provide one row of continuous silicone on rib.

0,8 mm thick Galvanised Gable Flashing (industrial type)	462 mm girth (262 + 200 vertical), 3 x bends (2 are shallow bends). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row x 0,6 mm thick galvanised broad flute metal closer on side wall cladding. Provide one row of continuous silicone on rib.
0,8 mm thick Chromadek Side Wall Flashing	385 mm girth (231 + 154 vertical) side wall flashing, 2 x bends (1 is a shallow bend). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row of broad flute polycloser bedded in silicone (only for vertical side wall cladding). 154 mm girth (114 + 25 + 15 lip @ 15º) Chromadek counter flashing, 3 x bends (1 is a shallow bend). Counter flashing (side wall is a brick wall) to overlap with side wall flashing with at least 75 mm. Cut 6 mm wide groove into brick wall parallel to roof sheeting for counter flashing. Prime joint and seal with an approved 6 x 6 mm poly-urethane sealant.
0,8 mm thick Galvanised Side Wall Flashing	385 mm girth (231 + 154 vertical) side wall flashing, 2 x bends (1 is a shallow bend). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row of broad flute polycloser bedded in silicone (only for vertical side wall cladding). 154 mm girth (114 + 25 + 15 lip @ 15º) galvanised counter flashing, 3 x bends (1 is a shallow bend). Counter flashing (side wall is a brick wall) to overlap with side wall flashing with at least 75 mm. Cut 6 mm wide groove into brick wall parallel to roof sheeting for counter flashing. Prime joint and seal with an approved 6 x 6 mm poly-urethane sealant.
0,8 mm thick Galvanized Roof Overhang Barge Flashing	616 mm girth (286 + 300 vertical + 20 + 10 vertical) standard Craft-Lock barge flashing, 4 x bends (1 is a shallow bend). Fix flashing to roof sheeting with Posidriv screws and washers, and to 250 x 25 wide x 2,5 thick with 25 mm lip galvanised bracket. The galvanised bracket to be screwed to rafter ends with 2 countersunk brass screws. 150 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row of broad flute polycloser bedded in silicone, 1 row x Chromadek broad flute metal closer bedded in a row of silicone. Bend up trough to form a dam.
0,8 mm thick Chromadek Roof Overhang Barge Flashing	616 mm girth (286 + 300 vertical + 20 + 10 vertical) standard Craft-Lock barge flashing, 4 x bends (1 is a shallow bend). Fix flashing to roof sheeting with Posidriv screws and washers, and to 250 x 25 wide x 2,5 thick with 25 mm lip galvanised bracket. The galvanised bracket to be screwed to rafter ends with 2 countersunk brass screws. 150 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row of broad flute polycloser bedded in silicone, 1 row x Galvanised broad flute metal closer bedded in a row of silicone. Bend up trough to form a dam.
0,8 mm thick Chromadek Side Roof Overhang Flashing (carports)	616 mm girth (286 + 300 vertical + 20 + 10 vertical), 4 x bends (1 is a shallow bend). Fix flashing to roof sheeting with Posidriv screws and washers, and to 250 x 25 wide x 2,5 thick with 25 mm lip galvanised bracket. The galvanised bracket to be screwed to timber rafter ends with 2 countersunk brass screws or to be site welded to steel purlins. 150 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone.
0,8 mm thick Galvanised Side Roof Overhang	616 mm girth (286 + 300 vertical + 20 + 10 vertical), 4 x bends (1 is a shallow bend). Fix flashing to roof sheeting with Posidriv screws and washers, and to 250 x 25 wide x 2,5 thick with 25 mm lip galvanised bracket. The galvanised bracket to be screwed to timber rafter ends with 2

Flashing (carports)	countersunk brass screws or to be site welded to steel purlins. 150 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone.
0,8 mm thick Galvanised Valley Flashing	770 mm girth (308 + 27 vertical + 100 wide gutter + 27 vertical + 308), 6 x bends (2 x shallow bends). Fix valley gutter to top of valley rafters with Posidriv screws and washers (seal with silicone). Cut and bend valley gutter at main gutter with 25 mm down lip. 225 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone. 2 rows of narrow flute polyclosers in ribs bedded in silicone.
0,8 mm thick Galvanised Valley Side Wall Flashing	616 mm girth (308 + 27 vertical + 140 wide gutter + 141 vertical), 4 x bends (1 is a shallow bend). Fix valley gutter to top of valley rafter with Posidriv screws and washers (seal with silicone) and impact nails (6 mm dia x 60 long @ 200 c/c) to brick wall. Cut and bend valley gutter at main gutter with 25 mm down lip. 225 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row of narrow flute polyclosers in ribs bedded in silicone. 154 mm girth (114 + 25 + 15 lip @ 15º) galvanised counter flashing, 3 x bends (1 is a shallow bend). Counter flashing (side wall is a brick wall) to overlap with side wall flashing with at least 75 mm. Cut 6 mm wide groove into brick wall parallel to roof sheeting for counter flashing. Prime joint and seal with an approved 6 x 6 mm poly-urethane sealant.
0,8 mm thick Chromadek Flat Back Flashing	1200* mm wide (25 mm lips on sides bend down to angle of rib) x 925 mm girth, * width of roof monitors determine the final width of flat back flashing. Flat back flashing for full length between monitor and ridge. Fix flashing to roof sheeting with Posidriv screws or sealed type Aluminium blind pop rivets. 150 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row of broad flute polycloser bedded in silicone at bottom end of flat back flashing.
0,8 mm thick Galvanised Flat Back Flashing	1200* mm wide (25 mm lips on sides bend down to angle of rib) x 925 mm girth, * width of roof monitors determine the final width of flat back flashing. Flat back flashing for full length between monitor and ridge. Fix flashing to roof sheeting with Posidriv screws or sealed type Aluminium blind pop rivets. 150 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row of broad flute polycloser bedded in silicone at bottom end of flat back flashing.
0,8 mm thick Chromadek Wall Gutter	616 mm girth (154 vertical x 462 at slope), 1 x bend. Fix boundary/side valley gutter to top of valley rafter with Posidriv screws and washers (seal with silicone) and impact nails (6 mm dia. x 60 long @ 200 c/c) to brick wall. 225 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row x 0,6 mm thick galvanised narrow flute closers in ribs fixed to purlins with Posidriv screws and washers; seal with silicone. 154 mm girth (114 + 25 + 15 lip @ 15º) Chromadek counter flashing, 3 x bends (1 is a shallow bend). Counter flashing (side wall is a brick wall) to overlap with side wall flashing with at least 75 mm. Cut 6 mm wide groove into brick wall for counter flashing. Prime joint and seal with an approved 6 x 6 mm poly-urethane sealant.
0,8 mm thick Galvanised Wall Gutter	616 mm girth (154 vertical x 462 at slope), 1 x bend. Fix boundary/side valley gutter to top of valley rafter with Posidriv screws and washers (seal with silicone) and impact nails (6 mm dia. x 60 long @ 200 c/c) to brick wall. 225 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row x 0,6 mm thick galvanised narrow flute closers in ribs fixed to purlins with Posidriv screws and washers; seal with silicone. 154 mm girth

	(114 + 25 + 15 lip @ 15º) galvanised counter flashing, 3 x bends (1 is a shallow bend). Counter flashing (side wall is a brick wall) to overlap with side wall flashing with at least 75 mm. Cut 6 mm wide groove into brick wall for counter flashing. Prime joint and seal with an approved 6 x 6 mm poly-urethane sealant.
0,8 mm thick Chromadek Corner Piece Flashing (for monitors)	231 wide x 77 vertical x 462 long, shallow bend for horizontal portion. Fix flashing to roof sheeting with Posidriv screws or sealed type Aluminium blind pop rivets. Seal overlap with 2 rows of pop rivets and 2 rows of silicone. Provide broad flute polyclosers bedded in silicone in troughs.
0,8 mm thick Galvanised Corner Piece Flashing (for monitors)	231 wide x 77 vertical x 462 long, shallow bend for horizontal portion. Fix flashing to roof sheeting with Posidriv screws or sealed type Aluminium blind pop rivets. Seal overlap with 2 rows of pop rivets and 2 rows of silicone. Provide broad flute polyclosers bedded in silicone in troughs.
Walls: (m)	
0,8 mm thick Chromadek External Vertical Flashing	462 mm girth (231 + 231), 3 x bends (2 x shallow bends). Fix flashing to roof sheeting with Posidriv screws and washers. 150 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone.
0,8 mm thick Galvanised External Vertical Flashing	462 mm girth (231 + 231), 3 x bends (2 x shallow bends). Fix flashing to roof sheeting with Posidriv screws with washers. 150 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone.
0,8 mm thick Chromadek Internal Vertical Flashing	462 mm girth (231 + 231), 3 x bends (2 x shallow bends). Fix flashing to roof sheeting with Posidriv screws with washers. 150 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone.
0,8 mm thick Galvanised Internal Vertical Flashing	462 mm girth (231 + 231), 3 x bends (2 x shallow bends), fix flashing to roof sheeting with Posidriv screws with washers. 150 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone.
0,8 mm thick Chromadek Drip Flashing	154 mm girth (64 vertical + 50 + 20 vertical + 20) standard drip flashing to suit roof sheet, 3 x bends. Fix flashing to girts or roof sheeting with sealed type Aluminium blind pop rivets or Posidriv screws with washers. 50 mm overlap sealed with one row of silicone and stitched together with sealed Aluminium blind type pop rivets.
0,8 mm thick Galvanised Drip Flashing	154 mm girth (64 vertical + 50 + 20 vertical + 20) standard drip flashing, 3 x bends. Fix flashing to girts or roof sheeting with sealed type Aluminium blind pop rivets or Posidriv screws with washers. 50 mm overlap sealed with one row of silicone and stitched together with sealed blind type pop rivets.
0,8 mm thick Chromadek Window Flashings	154 mm girth 3 x bends. Different flashing details for sill, jamb and top of window. Contractor to provide details to Engineer for approval. One row of narrow flute polyclosers bedded in silicone above and below window frame. Fix flashings to girts or roof sheeting with Posidriv screws and washers or sealed type Aluminium blind pop rivets. 100 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone. Seal around window frame with silicone to waterproof flashings. 1 row x 0,6 mm thick Chromadek broad flute metal closer for sill flashing.

0,8 mm thick Galvanised Window Flashings	154 mm girth 3 x bends. Different flashing details for sill, jamb and top of window. Contractor to provide details to Engineer for approval. One row of narrow flute polyclosers bedded in silicone above and below window frame. Fix flashings to girts or roof sheeting with Posidriv screws and washers or sealed type Aluminium blind pop rivets. 100 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone. Seal around window frame with silicone to waterproof flashings. 1 row x 0,6 mm thick galvanised broad flute metal closer for sill flashing.
0,8 mm thick Chromadek Door Flashings	154 mm girth 3 x bends. Different flashing details for sill, jamb and top of window. Contractor to provide details to Engineer for approval. One row of narrow flute polyclosers bedded in silicone above and below window frame. Fix flashings to girts or roof sheeting with Posidriv screws and washers or sealed type Aluminium blind pop rivets. 100 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone. Seal around window frame with silicone to waterproof flashings. 1 row x 0,6 mm thick chromadek broad flute metal closer for sill flashing
0,8 mm thick Galvanised Door Flashings	154 mm girth 3 x bends. Different flashing details for sill, jamb and top of window. Contractor to provide details to Engineer for approval. One row of narrow flute polyclosers bedded in silicone above and below window frame. Fix flashings to girts or roof sheeting with Posidriv screws and washers or sealed type Aluminium blind pop rivets. 100 mm overlap sealed with 2 rows of pop rivets and 2 rows of silicone. Seal around window frame with silicone to waterproof flashings. 1 row x 0,6 mm thick galvanised broad flute metal closer for sill flashing
0,8 mm thick Chromadek Bull Nose Flashing	462 mm girth (262 +200 vertical), 3 x bends excluding curving (2 are shallow bends), Fix flashing to roof sheeting with Posidriv screws and washers. 300 mm max. overlaps (run outs) sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row x 0,6 mm thick Chromadek broad flute metal closer on side wall cladding. Provide one row of continuous silicone on rib. Contractor to measure radius on site prior manufacturing.
0,8 mm thick Galvanised Bull Nose Flashing	462 mm girth (262 + 200 vertical), 3 x bends excluding curving (2 are shallow bends). Fix flashing to roof sheeting with Posidriv screws and washers. 300 mm max. overlaps (run outs) sealed with 2 rows of pop rivets and 2 rows of silicone. 1 row x 0,6 mm thick Galvanised broad flute metal closer on side wall cladding. Provide one row of continuous silicone on rib. Contractor to measure radius on site prior manufacturing.
Roof Insulation: (m²)	
White Bubble Foil on white straining wires (abattoirs only)	Lay insulation strictly to manufacturer's specifications. Use 1,6 mm diameter white PVC coated straining wires @ 300 mm c/c max. Refer to clause 2.3.7 of Technical Specification BA: Roof Coverings.
420 RSA heavy duty reinforced reflective Aluminium foil	Lay insulation strictly to manufacturer's specifications. Refer to clause 2.3.7 of Technical Specification BA: Roof Coverings.

Rainwater Goods:(m)	
100 x 75 x 0,8 mm thick Chromadek beaded non-supporting box gutter	Provide 25 x 1 mm thick galvanised fascia straps @ 686 c/c to support fascia of gutters; fix with 6 mm galvanised gutter bolts, nuts and washers. All accessories and ancillary items included. Roof sheeting troughs to be have drip bend.
100 x 75 x 0,6 mm thick Chromadek down pipes; height < 3 m	Provide one down pipe for every 6 m of gutter length. For gutter length of 3 to 6 m, provide two down pipes. All accessories and ancillary items included.
100 x 75 x 0,6 mm thick Chromadek down pipes; 3 m < height < 5 m	Provide one down pipe for every 6 m of gutter length. For gutter length of 3 to 6 m, provide two down pipes. All accessories and ancillary items included.
125 x 100 x 0,8 mm thick Chromadek self-supporting box gutter	Gutter to be braced back to the roof sheeting with a 25 x 1 mm thick galvanised fascia straps @ 686 c/c. The detail can only be applied to sheeting with a max. cantilever of 450 mm from first purlin. Roof sheeting troughs to be have drip bend.
125 x 100 x 0,8 mm thick Chromadek down pipes	Provide one down pipe for every 6 m of gutter length. For gutter length of 4,5 to 6 m, provide two down pipes. All accessories and ancillary items included.
100 x 100 x 0,8 mm thick Chromadek down pipes	Provide one down pipe for every 6 m of gutter length. For gutter length of 4,5 to 6 m, provide two down pipes. All accessories and ancillary items included.
Pipe Flashings: (No. and Dia.)	
Dektite pipe flashings to diameter	For all residential type of buildings, pipe protrusions through roof sheeting will be eliminated by re-routing existing pipe work. For all other pipe protrusions: Use Dektite no. 2 for pipe diameters 40 - 80 mm and Dektite no. 4 for pipe diameters 80 - 150 mm. Dektite flashings are made of E.P.D.M. rubber compound of a carbon black colour.
0,8 mm thick Chromadek Cravat and Cowl Flashing to diameter	Refer to roof and wall details no 1 and 2. (Bound into the back of this document).

Pipework: (No.)	
Re-route existing pipes; diameter and number	Re-routing of roof void geyser pipework: Disconnect and remove existing overflow pupe from Latco - and or Safety Valve, supply and connect new 15-28mm dia polycop pipe to existing Latco - and or Safety Valve including all necessary fittings, adaptors, brackets, etc. and re-route pipework in ceiling or roof void to protrude through external wall, including making good of external wall, irrespective of finish. Allow approximately 7m horizontal and 3m vertical pipework to ground level per geyser, complete with standard primer, one undercoat and two coats of super acrylic paint to exposed pipework to match existing paint system and colour. Ventilation pipework: Remove existing 100mm dia ventilation pipe section protruding through roof covering. Install 90° bend below roof level and re-route ventilation pipe to clear overhang. Install 90° reducing 100 x 50 bend and rise with 50mm dia pipe to 600mm. Install standard sewer pipe ventilation cowl on top of ventilation pipework. Pipe material must adapt to existing material of ventilation pipework. The bracketing and supports of the ventilation pipework shall be as per manufactuers specifications. Standard primer, one coat undercoat and two coats of super acrylic paint to exposed pipework to match existing paint system and colour.

BA.03.01 **SPECIFICATION FOR PAINTING OF PREVIOUSLY PAINTED GALVANIZED ROOFS OR GALVANIZED IRON ROOFS**

Specification of paint shall be equal or similar approved to Plascon paint for Galvanised iron roofs or previously painted galvanised iron roofs.

A two coat system shall be used of one coat Plascothane over Plascon Epiwash Strontium Chromate Primer offering good durability and protection.

Contractor must ensure that the work is done by a competent person and must be approved by the Engineer before work may commence

PRODUCTS TO BE USED

Plascon Aquasolv Degreaser (GR1)
Plascon Epiwash Strontium Chromate Primer (AW255)
Plascothane ‘421’ Industrial Dual Pack Polyurethane Enamel

SURFACE PREPARATION – PREVIOUSLY PAINTED

Remove all peeling paint by sanding, scraping or water cooled grinders (BOCSH GNS14) fitted with reversible knotted wire brush available from TVL Brush Code Z037 (Werner Group of Companies). Care must be taken not to remove any sound galvanizing. Any unsound paint will fail at a later stage. Wash roof with Aquasolv degreaser, scotch brite pads and rinse thoroughly with clean water. Ensure that all Aquasolv Degreaser is properly washed off.

SURFACE PREPARATION - UNPAINTED GALVANISED

Wash roof with Aquasolv Degreaser, scotch brite pads and rinse thoroughly with clean water. Ensure that all Aquasolv Degreaser is properly washed off.

APPLICATION

Apply one coat of Epiwash Strontium Chromate Primer using airless spray. For conventional spraying, thin with Epiwash Thinner (TH128). Allow 4 hours drying time. Apply a second coat if necessary to achieve the specified DFT of 25 – 35 microns.

Apply one coat Plascothane by airless spray to achieve complete obliteration. Ensure that a single coat of wet film application of 88 – 135 microns is achieved. This will give a DFT of 50 – 75 microns. Application in high humidity environments (75% RH) may cause surface bloom.

GUARANTEE

The Contractor must give a written 5 year guarantee for the quality and workmanship of the paint work (fair wear and tear excepted). The Contract shall be liable for any peeling or flaking paint applied by the Contractor and shall execute all such work of repair, rectification and making good of painted surfaces as may be ordered in writing by the Engineer. The manufacturer must carry out inspections at regular intervals during the construction period. He must issue a certificate of acceptance and compliance on completion to the client.

BA.03.02 BASF SPECIFICATION FOR OVER COATING OF CHROMADEK ROOFS

RECOMMENDED COATING SYSTEM

A two-coat system of high build BASF Polyurethane over BASF Primer giving excellent corrosion protection.

Proprietary Degreaser (BASF Approved)
BASF Primer
BASF Polyurethane Top Coat

The Technical Data Sheets for these products must be complied with fully.

SURFACE PREPARATION

- All existing paint coatings to be removed by means of water assisted mechanical brushing using “Scotchbrite stitched abrasive discs Cut and Polish Medium Grade”.
- Degrease using bristle brushes and BASF approved degreaser. Rinse with clean potable water and allow to dry.
- The use of emery pads/paper is not permitted as this will result in scouring of the galvanizing.

Note: the Contractor may propose alternative methods for preparing the surface which must be approved by the paint supplier.

GALVANIZING THICKNESS DETERMINATION

Prior to the application of the primer, the thickness of the galvanizing (Zinc Coat) is to be measured and the measurements recorded. The number of readings shall amount to not less than 5% of the total roof surface area, i.e. if the area of the roof is 1000m^2, then 50 readings are to be taken, distributed evenly across the surface. In the event that greater than 10%of the test have less than 15 micron of galvanizing then two coats of primer must be used.

APPLICATION OF COATINGS

The surface temperature of the roof shall not exceed 60^{o}C at the time of the application of the coating. Should a suitable thermometer not be readily available, as a good rule of thumb, 60^{o}C is generally accepted as the temperature at which the bare hand cannot be held comfortably on the hot surface.

Should the temperature be considered to be in excess of 60^{o}C, then unless approved by BASF, painting must be delayed.

- One or two full coats of BASF Primer which will be dependant on the thickness of the Zinc coating from measurements taken prior to commencement of the coating application.
- One full coat of BASF Polyurethane topcoat.

Primer Coat/s

As soon as the surfaces are dry, apply by airless spray, one (1) full coat of BASF Primer, at a dry film thickness of 10-15 micron. Allow a minimum of 1 hour but no more than 48 hours at 22^{o}C before over coating.

Top Coat

Apply by airless spray, one (1) full coat of BASF Polyurethane to a dry film thickness of 40-45 micron. Colour as per ISCOR colour standard.

- All the above-mentioned products must be applied strictly in accordance with the relevant Product Data Sheet and applied as per the code of practice.
- The paint as supplied has been formulated to attain the correct DFT as specified. Thinners are therefore not normally required however if necessary only BASF approved thinners should be used as this can effect application and result in poor quality coating.

TEST AREA

On each separate roof (for a large contract) then a minimum test area of 1m^2 must be provided for testing by the BASF Coatings representative. This area must be easily accessed and representative of the specific contract. Normally this will be undertaken at least 7 days after roof completion to ensure thorough curing of the paint. Variations in application due to the environment will require additional test areas.

The BASF Coatings representative will perform tests on this area and successful testing will result in the signing off the particular contract.

BA 03.2 SCHEDULED ITEMS

BA.01 **Supply and install cladding and roofing:** ..... **Unit: m²**

The area measured will be that of the exposed surface of the finished building as specified in, Subclause 8.1.1 of SANS 1200 HB.

Separate items will be scheduled for roofing materials and side cladding, subdivided for each type of roofing, cladding and finish.

The rate shall cover the cost of supplying, delivering, storing on site, handling, moving, installing and fixing the roofing or cladding (finished or prepainted as scheduled) complete with all necessary fasteners (all roofing and cladding materials and accessories are to be supplied by a South African-based manufacturer and are subject to a three year written guarantee for water tightness and workmanship). The rate shall also cover the cost of cutting, notching, waste, all scaffolding, temporary supports, hoisting facilities and safety precautions (see Subclause 8.1.1 of SANS 1200HB).

BA.02 **Forming cranks, bullnoses, etc:** ..... **Unit: m**

Cranks, bullnoses, etc. will be measured by length, with bullnoses to a maximum of 600mm radius and bend to maximum of 90°.

Separate items for cranks, bullnoses, etc, will be scheduled for each different type of sheeting, profile and finish.

The rate shall cover the cost of supplying, delivery, storing on site, handling, moving, installing and fixing of cranks, bullnoses, etc. and shall be measured as an extra over the specified roof sheeting. The rate shall also cover the cost of cutting, notching, waste, all necessary scaffolding, temporary supports, hoisting facilities and safety precautions (see Subclause 8.1.2 of SANS 1200 HB).

BA.03 **Carefully remove existing cladding and roofing:** ..... **Unit: m²**

The area measured will be that of the exposed surface of finished building (see Subclause 8.1.1 of SANS 1200 HB).

Separate items will be scheduled for roof covering and side cladding, without differentiating amongst different profiles, materials, etc.

The rate shall cover the cost of removing of existing roofing or side cladding, inclusive of flashings and sundry items, from timber or steel purlins, and the removal from site of all such material. The rate shall also cover the cost of any scaffolding, temporary supports, hoisting facilities etc. as well as credit for the redundant material becoming the property of the Contractor.

The rate shall also cover all temporary necessary dust screens, sheets, plastic linings, etc. laid horizontal or vertical inside existing roof spaces or voids on top of ceilings, trusses, etc. to protect all contents inside the buildings while replacing or repairing the roof coverings.

BA.04 **Carefully remove and store existing cladding and roofing:** **Unit: m²**

The area measured will be that of the exposed surface of finished building (see Subclause 8.1.1 of SANS 1200 HB).

Separate items will be scheduled for roof covering and side cladding without differentiating amongst different profiles etc.

The rate shall cover the cost of removing of existing roof sheeting or side cladding inclusive of flashings and sundry items from timber or steel purlins, the temporary storage of the removed sheeting or cladding at a store area (position of store area to be indicated on site). The rate shall also cover the cost of any scaffolding, temporary supports, hoisting facilities etc.

The rate shall also cover all temporary necessary dust screens, sheets, plastic linings, etc. laid horizontal or vertical inside existing roof spaces or voids on top of ceilings, trusses, etc. to protect all contents inside the buildings while replacing or repairing the roof coverings.

BA.05 **Re-erect stockpiled cladding and roofing:** **Unit: m²**

The area measured will be that of the exposed surface off the finished building (see Subclause 8.1.1 of SANS 1200 HB).

Separate items will be scheduled for roof covering and side cladding without differentiating amongst different profiles, materials, etc.

The rate shall cover the cost of preparing, re-erecting, handling, moving, installing existing stockpiled roofing and cladding, including new fixing fasteners, etc. complete. The rate shall also cover the cost of cutting, notching, waste, all scaffolding, temporary supports, hoisting facilities and safety precautions (see Subclause 8.1.1 of SANS 1200HB).

BA.06 **Supply and install sundry items, etc:** **Unit: m**

Flashing, ridging, etc. will be measured by length.

Separate items will be scheduled for each type, finish and shape of sundry item.

The rate shall cover the cost of supplying, delivery, storing on site, handling, moving, installing and fixing the relevant item complete with all fasteners and sundry items as stipulated in BA.02.3.4.

The rate shall also cover the cost of cutting, notching, waste and of all scaffolding, temporary supports, hoisting facilities and safety precautions (see Subclause 8.1.1 of SANS 1200 HB).

BA.07 **Supply and install roof insulation:** **Unit: m²**

The area measured will be that of the exposed surface, no deductions being made for openings left or cut for protrusions such as those specified in Subclause 5.7 of SANS 1200 HB, or for ventilators and the like. Deductions will be made for windows and other openings of similar dimensions.

The rate shall cover the costs of supplying, delivery, storing on site, handling, moving, installing and fixing complete with all necessary fasteners as specified in BA.02.3.7, and shall also cover the cost of cutting, notching, waste and of all scaffolding, temporary supports, hoisting facilities and safety precautions (see Subclause 8.1.1 of SANS 1200 HB).

BA.08 **Supply and install waterproofing:** **Unit: m^2**

The area measured will be that of the exposed surface, no deductions being made for openings left or cut for protrusions such as those specified in Subclause 5.7 of SANS 1200 HB, or for ventilators and the like. Deductions will be made for windows and other openings of similar dimensions.

The rate shall cover the costs of supplying, delivery, storing on site, handling, moving, installing and fixing complete with all necessary fasteners as specified, and shall also cover the cost of cutting, notching, waste and of all scaffolding, temporary supports, hoisting facilities and safety precautions (see Subclause 8.1.1 of SANS 1200 HB).

BA.09 **Supply and install rainwater goods:** **Unit: m**

Rainwater goods and similar lengths of constant profile will be measured by length.

Sundry items such as stop-ends, bends, shoes, etc. are deemed to be included in the tendered rate per metre.

Separate items will be scheduled for each type, finish, shape and when relevant, profile of rainwater goods. The rate shall cover the cost of supplying, delivery, storing on Site, handling, moving installing and fixing the relevant goods complete with all necessary fasteners, etc. as specified in BA.02.6 (all complete and subject to a three year written guarantee on water tightness and workmanship). The rate shall also cover the cost of cutting, notching and waste, and of all scaffolding, temporary supports, hoisting facilities and safety precautions (see Subclause 8.1.1 of SANS 1200 HB).

BA.10 **Carefully remove existing rainwater goods:** **Unit: m**

The length measured will be that of the exposed length of finished building.

No separate items will be scheduled for size, thickness, material, profile, galvanized or chromadek finished items.

The rate shall cover the cost of removing of existing rainwater goods inclusive of brackets and sundry items from timber or steel purlins and trusses, the cost of any scaffolding, temporary supports, hoisting facilities etc. and the allowance of credit for material to become the property of the Contractor and to be removed from the site.

BA.11 **Miscellaneous items:**

(a) Measured by number:

(i) (Description of item) Unit: No

(ii) Etc.

(b) Measured by linear metre:

(i) (Description of item)..... Unit: m

(ii) Etc.

The unit of measurement shall be the number or metre as applicable to each item.

The tendered rates shall include full compensation for manufacturing or providing and installing each item complete as per BA.03.1.

BA.12 Roof rehabilitation:..... Unit: m²

The area measured will be that of the exposed surface of building as specified in Subclause 8.1.1 of SANS 1200 HB. Separate items will be scheduled for roofing and side cladding, without differentiating between different profiles, finishings, fixing methods, etc.

The rate shall cover the cost for inspecting, removing existing and supplying and fixing new Leak King or posidriv screws or nails and mechanisms, sealants, sealer strips, etc. complete.

The rate shall also cover the cost of cutting, waste, all scaffolding, temporary supports, etc. all to the approval of the Engineer.

BA.13 Supply and install additional fixing screws, etc:..... Unit: No.

The unit of measurement will be the number of additional screws installed.

The rate shall cover the cost for removing defective fixing screws as indicated by the Engineer, and replacing aforesaid with new Leak King or equivalent approved fixing screws in similar previous positions.

No separate items will be scheduled for roof sheeting, side cladding or different profiles. Payment under this item shall not include the screws to be replaced under the roof rehabilitation item above.

BA.14 Carefully remove and re-erect ventilation units:..... Unit: No.

The unit of measurement will be number of ventilation units removed, temporarily stored and resized to similar positions.

The rate shall cover the cost for carefully removing existing ventilation units approximately 2,5m² in area from existing roof structures, temporary storage, servicing of existing ventilation units, cleaning, re-erecting later onto new roof sheeting (irrespective of type or profile of sheeting), new ventilation flashings and counter flashings, sealants, fixing screws, fasteners, etc. complete. The rate shall also cover the cost for cutting openings into new sheeting for ventilation units, waste, all necessary scaffolding, temporary supports, hoisting facilities and safety precautions (see Subclause 8.1.1 of SANS 1200 HB).

BA.15 **Carefully remove and re-erect birdproofing:** **Unit: m²**

The area measured will be that of the exposed surface to be covered with bird-proofing.

The rate shall cover the cost for carefully removing chicken wire bird-proofing stapled to each roof truss tie beam at roof overhang between beam-filling and fascia board, temporary storage, cleaning of bird-proofing, re-erecting later into similar previous position. The rate shall also cover the cost for cutting, fixing staples, waste, scaffolding, etc.

BA.16 **Prepare existing roof sheeting and repaint:** **Unit: m²**

The area measured will be that of the exposed surface of roof sheeting painted (measured on flat area as for roof coverings.)

The rate shall cover the cost for removing existing paint and cleaning surfaces with an approved degreaser and scotch brite pads and rinsing thoroughly by means of pressure washing to receive one new coat "Epiwash Strontium Chromate Primer" or equivalent approved primer coat and one coat "Plascothane Twin pack Polyurethane Paint" or equivalent approved polyurethane roof paint, supplying, delivery and applying new primer and finishing coat, etc., without distinguishing between roof sheeting, side cladding, profile, finish, etc. See also BA 03.02

The rate shall also cover the cost of waste, all necessary scaffolding, etc.

BA.17 **Replacement of existing roof tiles in patchwork:** **Unit: number**

The unit of measurement will be number of roof tiles removed, installation of new roof tiles similar to existing roof tiles.

The rate shall cover the cost for carefully removing existing roof tiles approximately 350mm x 350mm in area from existing roof structures, installation of new roof tiles and ridge flashings, sealants, fixing screws, fasteners, etc. complete. The rate shall also cover the cost, waste, all necessary scaffolding, temporary supports, hoisting facilities and safety precautions.

BA.18 **Install wire chicken mesh over thatch roofs:** **Unit: m²**

The unit of measurement will be square metre of wire chicken mesh installed over thatch roofing.

The rate shall cover the cost of supplying, cutting and placing of the wire mesh, all labour, necessary scaffolding and safety precautions. The rate shall also include the provision of all tools and the supply and fixing of binding wire and fixing-nails.

BA.19 **Pressure Clean existing roof tiles:** **Unit: m^2**

The area measured will be that of the exposed surface of roof tiles pressure cleaned (measured on flat area as for roof coverings.)

The rate shall cover the cost for removing existing dirt and cleaning surfaces by means of pressure washing with an approved degreaser and rinsing thereof.

The rate shall also cover the cost of water connection, all necessary scaffolding, etc.

TECHNICAL SPECIFICATION

BB CARPENTRY AND JOINERY FOR ROOFS AND CEILINGS

CONTENTS

BB 01 SCOPE
BB 02 STANDARD SPECIFICATIONS
BB 03 VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS
BB 04 DETAIL OF WORK
BB 05 MAINTENANCE
BB 06 MEASUREMENT AND PAYMENT

BB 01 SCOPE

Carpentry and joinery shall mean the repair and maintenance of materials and components such as removal of existing timber roof trusses, purlins, ceilings, etc, and the installation of new timber trusses and other timber roof members, structural beams, purlins, battens and ceilings. This specification does not include work related to roof coverings and paintwork, which are specified elsewhere.

This specification covers the repair of existing timber members in roof trusses, the removal and replacement of existing timber members from roof trusses and associated timber roof members and ceilings. This specification also covers the supply, delivery and installation of new timber trusses, purlins, battens and beams for various types of timber related structures and ceilings.

The complete scope of repair work shall be as described in BB 04: Detail of repair work.

Maintenance of this part of the installation shall be performed in accordance with Additional Specification SA: General Maintenance and the specific requirements included in this Technical Specification.

BB 02 STANDARD SPECIFICATIONS

BB 02.01 GENERAL STANDARD SPECIFICATIONS

The latest edition, including all amendments up to date of tender, of the following specifications, publications and codes of practice shall be read in conjunction with this specification and shall be deemed to form part thereof:

OW 371	-	Specification of Materials and Methods to be used (Fourth revision, October 1993)
SANS 10243	-	The design, manufacture and erection of timber trusses
SANS 266	-	Gypsum plasterboard
SANS 1783 - 2	-	Stress-graded softwood: general structural timber
SANS 1783 - 4	-	Softwood brandering and battens
SANS 803	-	Fibre-cement boards

BB 02.02 ADDITIONAL SPECIFICATIONS

Technical Specification BA: Roof coverings
Technical Specification BD: Walls
Technical Specification BJ: Paintwork

BA 02.03 OCCUPATIONAL HEALTH AND SAFETY ACT

The Contractor shall be required to comply with the Occupational Health and Safety Act 85 of 1993, Construction Regulations 2014 and related regulations. Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

BB 03 VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS

BB 03.01 ADDITIONAL REQUIREMENTS FOR REPAIR OF TIMBER ROOF STRUCTURES

BB 03.01.01 Timber trusses

(a) Replacing timber trusses

The Engineer shall inspect timber trusses for defects and establish which timber trusses must be replaced.

Reasons for replacing trusses will include but not be limited to the following:

(i) Deflection exceeding acceptable limits;
(ii) Inadequacy in design, e.g. structural strength, structural instability, load conditions;
(iii) Decay of large portions of truss members (defective timber);
(iv) Large portions of truss members having so many defects e.g. cracked timber, corroded connector nail plates, etc, that it will be uneconomical to repair the defects.

(b) Repair of timber trusses

Repair work shall include but not be limited to the following:

(i) Strengthening of truss members, connections, splices and anchorage at supports;
(ii) Strengthening of truss members due to unforeseen loads, notching and cutting for services by other contractors;
(iii) Repair of truss members where large knots and wanes occur;
(iv) Replacing metal plate connectors in cases of corrosion, incorrect application of connector plates, incorrect size of connector plates, unsymmetrically fitted connector plates, connector plates with teeth flattened, minimum bite of less than 65 mm of a connector plate on a truss member;
(v) Replacing of decayed timber, particularly rafter ends at roof overhangs and at roofing screws. Timber subjected to insect attack and fungal decay should be treated with an appropriate preservative. Where there is a low risk of decay or insect attack, two coats of Creosote may be applied to the timber. Refer to clauses 8.1 and 8.2 in OW 371 for the preservation of wood in high-risk regions;
(vi) Replacing and/or repair of cracked timber members. Galvanised connector plates and metal straps may be considered;
(vii) Maximum slenderness ratio must be less than 180 for compression members that carry forces resulting from dead and live loads. Compression members 36 mm thick and longer than 1,8 m must have a continuous longitudinal runner centrally placed (or T-bracing) and properly connected and braced. For members that resist loads caused by wind, the slenderness ratio must be less than 250;
(viii) Plumb of trusses should not exceed 100 mm or total span/20 whichever is the least;
(ix) Exposed portions of the trusses shall be painted to match existing appearance.

The roof trusses shall be fully braced. The Engineer shall give instructions regarding the provision of bracing members to the roof system.

BB 03.01.02 Purlins (for sheeted roofs, battens for tiled roofs)

(a) Replacing timber purlins

The Engineer shall inspect timber purlins for defects and possible reuse. The Engineer shall establish which timber purlins need to be replaced.

Reasons for replacing purlins will include but not be limited to the following:

(i) Decayed timber, particularly at gable overhangs;
(ii) Broken, warped and brittle timber;
(iii) Worn-out roof screw holes;
(iv) Inadequacy in design, e.g. structural strength and excessive deflection due to large spans;
(v) Inappropriate spacing of purlins for the specific roof covering.

(b) Repair of timber purlins

Repair work shall include but not be limited to the following:

(i) For roof pitches under 45º the purlins shall be erected on edge (narrow edge).
(ii) All purlins shall be secured to rafters at each intersection in addition to nails. In roof voids a single 3,2 mm diameter galvanised wire tie bound twice with twisted ends or a galvanised bent plate connector shall be used for securing purlins to rafters. On roof overhangs only galvanised bent plate connectors shall be used for securing purlins to rafters.
(iii) Splices shall be staggered. Splices that do not conform to the requirements of clause 8.8 of OW 371, or clauses 8.5.1 and 8.5.2 of SANS 10234, must be repaired. Nailed galvanised plate connectors on either side of purlins are also acceptable.
(iv) Exposed portions of the purlins shall be painted to match existing appearance.

Skew nailing of purlins to trusses shall not be closer than 30 mm from the edge of the member.

BB 03.01.03 Structural timber

(a) Replacing structural timber

The Engineer shall inspect members of structural timber, i.e. beams and columns, for defects and shall establish which of these members must be replaced. Reasons for replacement will include but not be limited to the following:

(i) Deflection exceeding acceptable limits;
(ii) Inadequacy in design, e.g. structural strength, structural instability, load conditions;
(iii) Decay of a large portion of the member (defective timber);
(iv) Replacing of decayed timber, particularly at ends of beams.

(b) Repair of structural timber

Repair work shall include but not be limited to the following:

(i) Strengthening of members, connections, splices and anchorage at supports;
(ii) Strengthening of members due to unforeseen loads, notching and cutting for services by other contractors;
(iii) Exposed portions of structural timber shall be painted to match existing appearance;
(iv) Bolt connections shall be in accordance with the requirements of SANS 10163.

BB 03.01.04 Ceilings

New ceilings shall be installed in accordance with section 9 of OW 371.

(a) Brandering to ceilings

Brandering to ceilings shall be replaced where:

(i) Ceiling boards are replaced;
(ii) Brandering is broken, rotten and beyond any further use.

New brandering shall be provided in accordance with clause 9.4 of OW 371. The brandering shall continue over at least three bays and shall be staggered to ensure that splices do not all occur in one line. Brandering must be provided for light fitting support.

(b) Gypsum ceiling boards

Repairs to existing ceilings shall include the installation of new 6,4 mm thick gypsum ceiling boards with metal H-section jointing strips. The new ceiling boards shall be nailed to brandering with galvanised or cadmium-plated clout-headed nails.

Gypsum ceiling boards shall not be used in wet areas such as in ablutions, abattoirs, kitchens and bathrooms.

Ceiling boards shall be in long lengths, symmetrically arranged with smaller panels, closely butted and secured at 150 mm centres to brandering as specified.

Where it is necessary to replace ceiling boards onto existing brandering, new boards shall be installed by first drilling through and then securing with cadmium-plated flat headed wood screws, or alternatively by shot nailing to suit, to avoid unnecessary vibration or impact damage to adjacent elements.

Gypsum cove cornices 76 mm wide shall be provided where existing cornices are to be replaced.

Existing trap doors in ceilings shall be reused. If required, new 650 x 650 mm trap doors shall be installed.

No ceiling insulation must be provided unless specified.

Painting of the ceiling shall be done in accordance with Technical Specification BJ: Paintwork.

(c) Fibre cement ceiling boards

Fibre cement ceiling boards shall be installed in wet areas such as in ablutions, abattoirs, kitchens and bathrooms.

Fibre cement ceiling boards shall be 6 mm thick, complying with the requirements of SANS 803 and of the flat pressed type.

The boards shall be nailed to the brandering with 2 mm diameter galvanised or cadmium-plated clout-headed nails, spaced at 100 mm centres at edges of boards and 150 mm centres along the intermediate brandering. Ceiling boards shall be in long lengths, symmetrically arranged with smaller panels as required and closely butted.

Replacement of new ceiling boards onto existing brandering shall be done as described in BB 03.01.04(b) above.

Fibrous plasterboard cove cornices to ceilings shall be of 100 mm girth, provided by an approved manufacturer. Gypsum cove cornices 76 mm wide can be used in kitchens and bathrooms of houses. Powder-coated wall angles 25 mm wide shall be used for cornices in abattoirs.

Existing trap doors in ceilings shall be reused. If required, new 650 x 650 mm trap doors shall be installed.

Painting of the ceiling shall be done in accordance with Technical Specification BJ: Paintwork.

(d) Exposed T-system suspended ceilings

Repairs to existing suspended ceilings will include but not be limited to the following:

(i) Replace damaged panels with new ceiling boards;
(ii) Replace sections of damaged T-strips or H-strips;
(iii) Replace cornices;
(iv) Tension, fix and realign existing hangers;
(v) Install new hangers as required;
(vi) Clean ceiling boards, including washing of the ceiling boards with a mixture of water and sugar soap and wiping dry, or painting the ceiling boards.

(e) External gable fibre cement boards for side cladding

External tongued and grooved boarding shall be removed and replaced with 6 mm thick flat pressed fibre cement boarding. The boarding shall be fixed to new brandering as specified in this section. Provide painted 25 x 25 mm meranti quarter rounds at edges as required.

The boarding shall be painted in accordance with Technical Specification BJ: Paintwork.

BB 03.01.05 Fascia and barge boards

Repairs to fascia and barge boards shall include but not be limited to the following:

(a) Replace damaged and broken fibre cement fascia and barge boards.

(b) Replace missing, corroded and damaged H-profile jointing strips.

(c) Replace all nails with suitable length and diameter brass screws. Provide nylon plugs to timber where necessary.

(d) Align and fix existing fascia and barge boards.

(e) Paint fascia and barge boards in accordance with Technical Specification BJ: Paintwork. All sides including the edges must be painted.

(f) The roof covering shall cover the top edge of the fascia on gables.

BB 03.01.06 Timber trusses, purlins and battens

(a) Existing timber trusses and roof structure

(i) General

(1) The Contractor shall establish proper access and install adequate lighting to the roof voids to enable detailed inspections of structural deficiencies by the Engineer. Temporary scaffold planks shall be laid across bottom chords to allow access to all critical areas. After inspection, the extent of repairs is to be agreed with the Engineer.

(2) All completed work shall be inspected and approved by the Engineer.

(3) All new timber work shall comply with SANS 10163.

(4) Timber grade shall be S5 and replacement sizes are to match existing unless otherwise agreed.

(5) Repair details on attached sheets R1 to R3 shall form the basis for repairs. Any deviations from or variations to these details are to be approved by the Engineer. Any types of failure not covered by these details shall be discussed with the Engineer who will then issue the necessary repair instructions.

(ii) Procedures (watermarked and slightly rotten members)

(1) Watermarked and slightly rotten members need not be replaced or repaired if the following test indicate these members to be satisfactorily:

Using a 3,5 mm nail, make scratch marks in all these members to expose good unaffected timber. If scratch depth is 2 mm or less, it is acceptable and these members need only to be treated as described in (2) below.

(2) The members shall be wire-brush cleaned, free of any loose or deleterious material, then treated with 1 coat of creosote, or similar approved. Apply by brush to affected areas and 200 mm beyond, all to the manufacturer's specifications. Safety precautions shall be taken against possible health or fire hazards as specified by manufacturer.

(iii) Procedures (cracked and failed members)

(1) All members that are cracked right through will be regarded as failed members. Members with minor longitudinal cracks shall be repaired, following procedure 5 on sheet R3.

(2) The Contractor must allow for propping and/or bracing at failed members to ensure complete structural stability during repairs.

(3) Failed members as indicated in details 1 to 4 on sheets R1 to R3 shall be realigned by means of clamping with temporary backing pieces, after which repairs can proceed.

(4) Members that are damaged too badly to effect repairs will have to be replaced or doubled up to suit the circumstances.

(5) Once all repair work has been completed the Contractor must clean out the ceiling void, free of all rubbish, excess building material and all other foreign matter and make good any damage caused to ceilings, etc.

(6) Any alternative repair proposal shall be submitted in writing to the Engineer.

BB 04 DETAIL OF WORK

The detail of the work is described in the Schedule of Quantities.

BB 05 MAINTENANCE

Note: There will be no maintenance work required for carpentry and joinery for roofs and ceilings in this contract.

This specification shall be read in conjunction with Additional Specification SA: General Maintenance.

All components forming part of this specification for carpentry and joinery for roofs and ceilings shall be maintained as part of the maintenance of installations as defined in Additional Specification SA: General Maintenance.

Maintenance shall include all repair work, replacing of components, routine inspections, fixing of defects or any other actions or rectifying measures necessary to maintain the perfect functional condition of carpentry and joinery for roofs according to the operation and maintenance manuals and as specified in this specification.

All timber trusses and members of timber roofs shall be preserved in a good condition, i.e. failure free, free from insect attack and decay due to exposure to moisture.

Maintenance on the carpentry and joinery for roofs shall also include all other actions related to (or resulting from) maintenance, such as:

- Cleaning of the site and ceiling voids of rubbish and dirt;
- replacing any element that has failed;
- tightening, fixing or replacing of loose fasteners, premature corrosion of galvanised items like screws, nail plates, etc.

Remuneration for maintenance of the complete carpentry and joinery for roofs shall be deemed included in the tendered monthly payment for maintenance of the applicable installation.

BB 06 MEASUREMENT AND PAYMENT

BB 06.01 MEASUREMENT AND RATES

BB 06.01.01 General inclusion of costs

Notes:

All material scheduled to be removed shall be deemed to be existing damaged materials in small or large sections. All such redundant material shall become the property of the Contractor and must be removed from site immediately.

All new material used for repair work shall be of approved equal quality, colours, profiles, thickness, etc and shall in all cases match the existing materials and shall be fixed (internally or externally) to existing material or surfaces.

All replacement, removal and repair work shall be done carefully as to not damage any adjacent or other material or work. Any damage to other or adjacent materials or areas caused by the negligence of the Contractor shall be repaired by him free of charge.

All work scheduled to be removed or taken out shall be deemed to include the cleaning and preparation of the remaining sections, areas, or work to receive the new material or work specified.

Repair work shall also include all cutting, grinding, cutting into, welding, bending, strengthening, drilling, etc to repair or to improve the items or areas as new and to match the existing.

Work scheduled to be realigned and refixed shall be deemed to include all necessary new additional materials, brackets, connector plates, bolts, pip rivets, nails, screws, spacer blocks, clamps, timber, and labour, etc to leave the items as new and totally functional.

All new work are measured net and shall include all cutting, lapping, waste, bending, fixing, corners, mitres, fixing screws, pip rivets, nails, adhesive, grout, putty, etc, as well as cleaning and preparation of surfaces not already prepared as part of removed items, etc.

Unless scheduled otherwise, new ceilings and ceilings in patchwork shall be fixed to existing brandering and the Contractor must take special care not to damage the existing brandering when removing damaged ceiling boards.

BB 06.02. SCHEDULED ITEMS

NEW WORK

BB.01 Structural timber:

(a) Plates (sizes indicated) ..... Unit: m

(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) Etc

The unit of measurement shall be the metre of individual types of timber elements or number of complete trusses installed.

The tendered rates shall include full compensation for the supply of all materials, manufacture, cutting, waste, jointing, scaffolding, temporary supports, hoisting facilities and installation of the timber as specified, scheduled or shown on the Drawings.

BB.02 Ceilings:

(a) Ceiling boards, trapdoors, cornices, cover strips, etc (type and/or thickness indicated):

(i) Thickness, shape and description of applications ..... Unit: m^2, m, number

(ii) Etc for other thicknesses, shapes, etc

The unit of measurement shall be the number, metre or square metre of ceiling boards, trapdoors, cornices, etc installed complete as specified and scheduled.

The tendered rates shall also include full compensation for the construction of the ceilings, trapdoors, cornices, cover strips, etc including jointing strips, insulation blankets and brandering as specified.

BB.03 **Joinery:**

(a) Items measured by number:

(i) Doors, etc (type and size indicated) ..... Unit: number

(ii) Etc for other items measured by number

(b) Items measured by linear metre:

(i) Skirtings, rails, cover strips, quadrant beads, etc (size indicated) ..... Unit: m

(ii) Etc for other items measured by length

(c) Items measured by area:

(i) Eaves covering, etc (type and thickness indicated) ..... Unit: m^2

(ii) Etc, for other items measured by area

The units of measurement shall be the number, metre or square metre of each type and/or size of joinery item specified and installed complete.

The tendered rates shall include full compensation for the supply of all materials, manufacture, cutting, waste, fixing, scaffolding, temporary supports, hoisting facilities and installation of the joinery items.

Ironmongery to be included in the rates tendered for doors shall be as specified in the Technical Specification BD: Walls.

New joinery, will except where otherwise specified, be fixed or hung to existing material or surfaces.

ALTERATION WORK

BB.04 **Alterations and repairs to existing structures:**

(a) Indicate if repairs, alterations, removal or sealing, etc:

(i) Description of individual items to be repaired, replaced, altered, removed, sealed, etc ..... Unit: m^3, m^2, m, number

The unit of measurement for items repaired, replaced, altered, removed, sealed, etc shall be cubic metre, square metre, metre or number as scheduled. No distinction between sizes or profiles will be made for the removal of structural timber elements.

The tendered rates shall include full compensation for all costs to repair, refix, remove, cutting into, re-align, taking off, handling, temporary store, scaffolding, temporary supports, hoisting facilities and preparing existing remaining material or surfaces where applicable to receive new items as well as for credit for the redundant material becoming the property of the Contractor, etc as specified in the Standard and Technical Specifications and shall allow for all necessary labour, plant and new material needed for the repairs, replacement or alterations, etc to leave the scheduled items as new and to the approval of the Engineer. Refer also to the general inclusion of costs in BB.06.01.01."

BB.05 **Repairs to watermarked and slightly rotten timber roof members:** ..... Unit: m

The unit of measurement shall be the linear metre of timber roof members repaired as specified. No distinction will be made for size, type of member or position.

The tendered rate shall include full compensation for the complete repair work, wire brushing, creosote, etc as specified by the Engineer.

BB.06 **Repairs to damaged masonry, plastering and surface finishes:**

(a) Items measured by number:

(i) Description of item ..... Unit: No

(ii) Etc ..... Unit: m

(b) Items measured by linear metre:

(i) Description of item ..... Unit: No

(ii) Etc ..... Unit: m

The unit of measurement shall be the number or metre as applicable to each item.

The tendered rates shall include full compensation for the making good of masonry (stock or face bricks), beam-filling, plastering, painting, closing ends to troughs of sheet metal roof sheeting, repairs to structure at ends of rafters and purlins, protruding through brick walls, etc.

The tendered rate shall also cover the cost of cutting, notching and waste and of all scaffolding, temporary supports, etc.

BB.07 **Painting to top cords of timber trusses in roof voids:** ..... Unit: m

The unit of measurement shall be the metre.

The tendered rate shall include full compensation to prepare existing top cords (where applicable) to receive one coat creosote. No distinction will be made for size, type, new or existing members. The rate shall also cover the cost for waste, all scaffolding, etc.

BB.08 **Painting of existing members in overhangs:** ..... Unit: m

The unit of measurement shall be the metre.

Separate items will be listed for paint and/or creosote as specified.

The tendered rate shall include full compensation to prepare existing overhangs to receive paint or creosote as specified. No distinction will be made for size of existing members. The rate shall also cover the cost for waste, all scaffolding, etc.

TECHNICAL SPECIFICATION

BC WATERPROOFING OF CONCRETE ROOFS

CONTENTS

BC 01 SCOPE
BC 02 STANDARD SPECIFICATIONS
BC 03 VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS
BC 04 DETAIL OF REPAIR WORK
BC 05 MAINTENANCE
BC 06 MEASUREMENT AND PAYMENT

BC 01 SCOPE

This specification covers the repair/replacement of existing cement screeds and waterproofing, including all sundries, the removal of waterproofing and the supply, delivery, installation of new cement screeds, waterproofing and sundries for various types of concrete roofs.

Waterproofing shall mean the work to be carried out to repair/replace and maintain waterproofing materials and components, such as the repair/removal and maintenance of existing cement screeds and waterproofing and the installation of new cement screeds and waterproofing. This specification does not include work related to concrete work, plastering, gutters and down pipes specified elsewhere.

The complete scope of the repair work shall be as described in BC 04: Detail of repair work.

Maintenance of this part of the installation shall be performed in accordance with Additional Specification SA: General Maintenance, and the specific requirements included in this Technical Specification.

BC 02 STANDARD SPECIFICATIONS

BC 02.01 GENERAL STANDARD SPECIFICATIONS

The latest edition, including all amendments to date of the following specifications, publications and codes of practice, shall be read in conjunction with this specification and shall be deemed part to form part thereof:

OW 371	-	Specification of Materials and Methods to be used (Fourth revision, October 1993)
SANS 10021	-	SANS code of practice: Waterproofing of buildings.

BC 02.02 ADDITIONAL SPECIFICATIONS

Technical Specification BE: Floors
Technical Specification BF: Structural concrete

BC 02.03 OCCUPATIONAL HEALTH AND SAFETY ACT

The Contractor shall be required to comply with the Occupational Health and Safety Act 85 of 1993, Construction Regulations 2014 and related regulations. Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

BC 03 VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS

BC 03.01 ADDITIONAL REQUIREMENTS FOR REPAIR OF WATERPROOFING ON CONCRETE ROOFS

BC 03.01.01 Introduction

Section 6 Parts 6.4.1, 6.4.2 and 6.4.4 of OW 371 shall be adhered to when open concrete roofs are waterproofed. Existing waterproofing that leaks shall be replaced.

BC 03.01.02 General

Waterproofing materials shall be transported, handled and stored with care and laid strictly in accordance with the manufacturer's instructions. A clean, dry, smooth, firm and structurally adequate base with a fall of at least 1 in 50 (depending on the material selected) is required, with drainage to gutters and/or rainwater outlets on rood edges, as relevant. Attention shall be given to the detailed design of openings, projections, gutters, down pipes and finishes to make adequate provision for run-off water and to minimize blockages.

Corners and edges shall be covered or angle-rounded. Run-off over the edges of slabs shall be eliminated as this causes stains to the building. Fillets of 75 x 75 mm shall be provided at upstand corners.

The necessary gradient for waterproof membranes are normally provided on top of structures in low-density screeds and then finished, if necessary, with a cement/mortar topping. Screeds and toppings shall be of sufficient quality to provide a firm base. The following screed characteristics are suggested for waterproofing purposes:

(a) Compressive strength of at least 25 MPa at 28 days;

(b) Steel-trowel finish (light);

(c) Drying shrinkage of less than 0,2 % when tested in accordance with the testing conditions specified in SANS 836;

(d) Minimum screed thickness of 40 mm;

(e) Maximum moisture content of screeds:

  (i) Applications with a density of less than 500 kg/m^3 : 10 %

  (ii) Applications with a density exceeding 500 kg/m^3 : 7 %.

The screed should be cast or sawn into panels that do not exceed 9 m² to cater for drying shrinkage and to control cracking.

BC 03.02 MATERIALS

The more commonly used waterproofing materials are listed below, as well as some general comments on these materials. It is suggested that the manufacturers be consulted with regard to specific products. The Engineer's approval of the selected product shall be obtained prior to ordering.

BC 03.02.01 Bituminous materials

(a) Polymer-modified bitumen membranes

(b) Reinforced bitumen emulsions.

BC 03.02.02 Plastomeric membranes

Plastics such as polyvinyl chloride (PVC) are applied as single-layer systems and are loose-laid or fully bonded. A high degree of skill is required for the laying of these membranes.

BC 03.02.03 Reinforced liquid applied systems

Membranes based on acrylic polymer (or modified acrylic polymers) binders, reinforced with woven polyester or polypropylene fabrics, perform well as waterproofing membranes and are durable. These fully bonded systems require detailed specifications and strict supervision during application to prevent malpractice.

BC 04 DETAILS OF REPAIR WORK

The Schedule of Quantities indicates approximate quantities of work. Detailed instructions will be issued during construction.

BC 05 MAINTENANCE

Note: There will be no maintenance work required for waterproofing of concrete roofs in this contract.

This specification shall be read in conjunction with Additional Specifications SA: General Maintenance.

All components that form part of the waterproofing of concrete roofs shall be maintained during the maintenance phase of the Contract.

Maintenance shall include all repair work, replacing of components, routine inspections, repairing of defects or other actions or rectifying measures required to maintain the perfect functional condition of waterproofing on concrete roofs in accordance with the operation and maintenance manuals and as specified. All roofs shall be kept leak-free and watertight.

Maintenance of the waterproofed concrete roofs shall include all related actions such as replacing/repairing loose and blistering waterproofing, including cracked waterproofing membranes, loose seams, painting of waterproofing membranes, and cleaning and removing rubbish from waterproofed concrete roofs.

Remuneration for maintenance of the complete waterproofing of concrete roofs shall be deemed included in the tendered monthly payment for the maintenance thereof.

BC 06 MEASUREMENT AND PAYMENT

BC.01 MEASUREMENT AND RATES

BC.01.01 General inclusion of costs

Notes:

New waterproofing material scheduled shall be deemed to include all preparation of existing concrete or waterproofed areas and jointing of new to existing material. Where new material is to join existing material, the new material shall be of the same type and system as the existing waterproofing system. All waterproofing shall come with a ten year written guarantee for water-tightness and the cost of such guarantee shall be deemed to be included in the applicable tendered rates.

BC.02 SCHEDULED ITEMS

NEW WORK

BC.02.01 Approved waterproofing system to:

(a) Description of waterproofing system:

(i) Area of application or description of detailed item ..... Unit : m², m, number

The unit of measurement shall be the square metre, meter or number of areas or items waterproofed as specified and scheduled.

The tendered rates shall include full compensation for the supplying, delivering, storing on site, handling, moving, applying or installing and fixing the waterproofing system complete with all necessary sundry items, such as forming turn-ups or turn-downs, any flashing strips, dressing waterproofing around pipes and into outlets and channels.

The tendered rates shall also cover the cost for cutting and waste and for scaffolding, hoisting facilities, etc. All turn-ups and turn-downs will be deemed to be included in the area measured for the waterproofing and will not be paid for separately.

ALTERATION WORK

BC.02.02 Remove existing waterproofing and sundry items:

(a) Description of waterproofing material to be removed and location .....Unit: m^2

(b) Etc, for other material and locations

The unit of measurement shall be square metre of material removed.

The tendered rate shall include full compensation for the removing of existing waterproofing, flashing strips, sundry items, etc.

BC.02.03 Prepare existing surfaces:

(a) Prepare existing concrete surface to receive new screed as specified .....Unit: m^2

(b) Prepare existing concrete or screeded surface to receive new waterproofing system .....Unit: m^2

The unit of measurement shall be the square metre of the exposed surface prepared to receive the new screed or waterproofing material.

The tendered rates shall cover the cost for preparing the existing surfaces as specified and scheduled in (a) and (b) to receive new screeds or waterproofing.

BC.02.04 **Roof screeds:** ..... Unit: m^2

The unit of measurement shall be the square metre of exposed surfaces to be screeded.

The tendered rate shall include all costs for supplying, delivering, storing on site, handling, etc of the materials necessary for the screed, including mixing and laying of screeds to currents and falls and forming of sundry items such as fillets, etc complete. The tendered rate shall also cover the cost for forming of screeds around outlets, waste, and of all scaffolding, temporary supports, hoisting facilities, etc.

BC.02.05 **Repair bituminous based waterproofing system** ..... Unit : m^2

The unit of measurement shall be the square metre of the horizontal and vertical surfaces of waterproofing repaired to the approval of the Engineer. All turn-ups and turn-downs will be deemed to be included in the area measured for the waterproofing and will not be paid for separately.

The tendered rate shall include all costs for supplying, delivering, storing on site, handling, moving, installing and fixing the waterproofing system complete with all necessary sundry items, such as flashing strips, dressing waterproofing around pipes and into outlets and channels. The tendered rate shall also cover the cost of cutting and waste and for scaffolding, hoisting facilities, etc.

TECHNICAL SPECIFICATION

BD WALLS

CONTENTS

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BD 01 SCOPE

This specification covers the repair and maintenance of existing interior and exterior walls including all related building elements such as plastering, partitioning, wall tiling, windows, doors, etc, which form an integral part of an installation.

In determining the remedy for any repair work, the Engineer must take the climatic conditions in which all building elements have to function into consideration. Allowance should be made accordingly for the strength and durability of all components in relation to their purpose and application.

This specification does not include any work related to paintwork as this is specified elsewhere.

The complete scope of repair work shall be in accordance with the section: Detail of repair work.

BD 02 STANDARD SPECIFICATIONS

BD 02.01 GENERAL STANDARD SPECIFICATIONS

The latest edition, including all amendments up to date of tender of the following specifications, publications and codes of practice shall be read in conjunction with this specification and shall be deemed to form part thereof. All other relevant and applicable SANS regulations are also to be considered as minimum requirements, and in particular SANS 10400: The Application of the National Building Regulations.

OW 371	-	Specification of materials and methods to be used (Fourth revision, October 1993)
SANS 22	-	Glazed ceramic wall tiles and fittings
SANS 227	-	Burnt clay masonry units
SANS 545	-	Wooden doors
SANS 622	-	Gypsum cove cornice
SANC 680	-	Glazing putty for wood and steel sashes
SANS 727	-	Windows and doors made from rolled mill steel sections
SANS 10107	-	The fixing of glazed wall tiles
SANS 1236	-	Silvered glass mirrors for general use
SANS 1263	-	Safety and security glazing materials for buildings

BD 02.02 ADDITIONAL SPECIFICATIONS

Technical Specification BG: Metalwork
Technical Specification BH: Fittings
Technical Specification BJ: Paintwork

BD 02.03 OCCUPATIONAL HEALTH AND SAFETY ACT

The Contractor shall be required to comply with the Occupational Health and Safety Act 85 of 1993, Construction Regulations 2014 and related regulations. Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

BD 03 VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS

BD 03.01 ADDITIONAL REQUIREMENTS FOR REPAIR OF PLASTERED AND UNPLASTERED WALL SURFACES

BD 03.01.01 Introduction

A detailed survey of all existing building elements may reveal the necessity for remedial work of varying degree. The Engineer shall make an assessment of all aspects that need to be addressed.

BD 03.01.02 Plastering: General

All plaster shall comply with the requirements of SANS Standard Specification 523 and section 14 of OW 371. All plastering shall be painted in accordance with Technical Specification BJ: Paintwork, or tiled according to this specification BD.

The Engineer shall inspect the plaster surfaces and establish which wall plastering must be repaired. Reasons for replacing existing plastering will include, but not limited to the following:

(a) Excessive plaster cracking
(b) Loose (delaminated) and spalling plaster
(c) Dusting
(d) Scaling and flaking
(e) Defective plaster mix.

All chases shall be marked out in straight lines and neatly cut on either side of the recess for the pipe/conduit with an angle grinder. The width of the removed plastering must extend at least 30 mm beyond the edge of the chasing. Pipes or conduits shall be fixed before commencing grouting and plastering.

After the pipe has been put in place, the void shall be filled with a non-shrink cement grout of 60 MPa compressive strength at 28 days. The chases shall then be covered by fixing with shot-fired nails a weld mesh strip (30 mm longway x 10 mm shortway x 0,5 mm thick expanded metal lath) before applying the final plaster.

BD 03.01.03 Plastering: Walls of wet areas

Where necessary, hack off and remove existing internal plaster to walls. The substrates must be prepared to be sound, free from cement, grout, laitance, loose or segregated materials, voids or flaws and substances that could interfere with bonding of the new plaster. This preparation work can be done by means of clipping away with a chisel, steel-wire brush and angle grinders to the satisfaction of the Engineer. Smooth concrete must be chipped mechanically to prepare for bonding of new plaster. Before plastering commences, the substrates must be well wetted with clean water.

Only approved ready-mixed or pre-mixed bagged plaster mortar with 10 MPa compressive strength or equivalent may be used for plastering. Mix a liquid waterproofing admixture in a dilution of one part by volume with ten parts by volume of clean water. The diluted admixture is added to the appropriate dry cement/sand mixture. The mortar shall be produced in such quantities that will be used within one hour after mixing. The finished plasterwork shall be of an even and smooth towel surface finish.

When dry, apply two coats of an approved water dispersed epoxy resin coating to the plastered surfaces of the walls that are to be painted.

BD 03.01.04 External plastering

The Engineer shall mark out areas that need to be renovated. The Contractor shall neatly cut with an angle grinder in straight lines the edges of the poor patches of plaster that must be removed.

The substrate of the brick walls must be prepared to be sound, free from cement grout, laitance, loose or segregated material, voids or flaws and substances that might interfere with the bonding of the new plaster.

The surface must not be powdery or crumbly, and must exhibit adequate tensile strength. The preparation work can be done by means of chipping away with a chisel, steel-wire brush and angle grinders to the satisfaction of the Engineer.

Smooth surfaces must be chipped to provide mechanical bonding for new plaster. Before plastering commences the substrate must be well wetted with clean water.

Only approved ready-mixed or pre-mixed bagged plaster mortar with 5 MPa compressive strength or approved equivalent may be used for plastering. The Contractor shall submit the design mix with the volume of water to be added to the mortar mix for approval by the Engineer. An approved bonding agent must be added to the mortar mix.

The mortar shall be produced in quantities that will be used within one hour after mixing. Care shall be taken not to mix old mortar into any new batch.

The finished plasterwork shall be of an even and smooth wooden trowel (surface finish with rounded edges at sharp corners) to the satisfaction of the Engineer. The plasterwork shall be cured for seven days by any approved method to prevent loss of moisture.

Three (3) test cubes per sampling shall be taken at a frequency for every 15 m² plaster area. Cube moulds for nominal size 100 mm complying with the requirements of SANS Method 863 must be used. Final instructions for sampling, moulding, cutting and testing will be issued to the Contractor on site.

BD 03.01.05 Rough-cast plaster

Rough-cast plaster shall be applied in two coats. The undercoat shall be composed of one part cement and five parts sand finished with a wooden float. The finishing coat shall be composed of one part cement and three parts stone aggregate that will pass through a 4 mm sieve. The finishing coat shall be flicked on with a machine before the undercoat has set to obtain an even texture to match the existing rough-cast plaster.

Where the undercoat has already been plastered, the undercoat shall be prepared to receive the finishing coat. The surface of the undercoat plaster shall be chipped adequately to form a key and wetted before the finishing coat is applied.

BD 03.01.06 Fine rough-cast plaster

Fine rough-cast plaster shall be as for rough-cast plaster but the finishing coat shall be composed of one part cement and three parts coarse sand.

BD 03.01.07 Internal plastering

The surface of internal plaster shall be steel trowelled to a smooth, even and true finish. External plaster shall be finished to a true and even surface with a wood float. All plaster surfaces shall be free from blemishes, cracks, blisters or other defects. Plaster shall return into reveals and soffits of openings, and all angles shall be true and straight with salient angles slightly rounded.

Plastering of a surface shall be executed in one operation, as no joint marks will be allowed. Plaster on walls shall not be less than 12 mm or more than 20 mm thick and plaster on concrete shall be not less than 10 mm or more than 15 mm thick, except where specifically specified otherwise.

Only approved ready-mixed or pre-mixed bagged plaster mortar with 5 MPa compressive strength or approved equivalent may be used for plastering. The Contractor must submit the design mix with the volume of water that will be added to the mortar mix to the Engineer for approval.

BD 03.02 PARTITIONS

All internal non-load-bearing walls shall be inspected and the Engineer shall determine whether partitioning such as laminated plastic particleboard, polyester painted steel, vinyl clad gypsum panels or any other demountable partitioning should be replaced.

Where partitioning must be relocated or replaced, such new partitioning shall be non-combustible, provide acoustical privacy and comply with SANS 10400.

All new partitions shall assemble into a rigid structure and all units shall be readily removable from either side without disturbing adjacent units.

All exposed trims for doorframes, glazing and skirting are to be of aluminium, or alternatively be painted in accordance with Technical Specification BJ: Paintwork.

The type of boarding and jointing or cover strips shall be in accordance with the Schedule of Quantities.

BD 03.03 WALL CRACKS

Wall cracks shall be evaluated to determine the nature and severity of the occurrence of the cracks. The Engineer shall inspect all plastered and unplastered walls and identify the underlying factors causing cracks. Repairs shall be carried out in accordance with the Particular Specifications.

BD 03.04 FACE BRICKS

Face bricks shall be inspected for dirt, efflorescence, staining, oil, paint, lichens and mosses, water, smoke and soot, rust, or damage caused by chemical reaction.

Where efflorescence appears, light brushing and hosing down with clean water is recommended for most cases. The brickwork must be saturated with clean water before applying any chemical and washed down with clean water afterwards. Cleaning can also be achieved with scrubbing, water jetting with cleaning agents and soaps, etc. Staining caused by non-water-soluble salts, such as vanadium, manganese and iron, shall be treated as follows:

(a) Remove vanadium staining by washing the wall with a solution of 100 g to 1 litre of water using caustic soda. (Use the corresponding secondary potassium salts where available, as these will be less likely to cause visible secondary efflorescence.) If secondary efflorescence occurs, wash it off with clean water.

(b) Manganese stains must be removed using proprietary brand chemical compounds based on hydrochloric acid with modifiers and sodium fluoride. These solutions should be applied using full strength as recommended by the manufacturer.

(c) Where rust/iron stains occur, wash the affected area with a solution of 50 g oxalic acid, 20 g sodium fluoride, 15 g citric acid in 1 litre of fresh, clean water. Apply the solution to a dry wall and leave it on the wall until the stain has dissolved. Wash down using a solution of 50 g bicarbonate of soda in one litre of water.

External environmental stains and smears caused by soot, smoke, industrial pollution and spillage of oil, paint and other compounds, including micro-organic growths such as fungi, lichens and mosses on brickwork, must be identified and dealt with in an appropriate and approved way.

Care shall be taken to test the effect of some of the chemicals and compounds for possible harmful effects on the colours of the brickwork and on adjacent materials, as well as for possible toxicity to human, animal and plant life. All cleaning procedures shall be carried out with full knowledge of all the potential dangers to human and animal health, and the appropriate safeguarding and precautionary measures shall be put in place.

BD03.04.01 APPLICATION OF SILANE / SILOXANE BASED WATER REPELLENT/IMPREGNATION

The surface to be treated shall be clean, sound and dry. It should be free from dust, dirt, loose particles and oily or greasy deposits.

The surface shall be dry to allow maximum penetration. No application shall be made for at least four days after rain.

In order to remove any loose particles, the walls shall be pressure-cleaned with water before application of the silane / siloxane based water repellent. After pressure cleaning of the walls, the walls shall be left to dry in sunny conditions for at least 4 days, and where dagha (cement) has come loose in the joints and left a void, dagha (cement) joint filling shall be prepared to match the existing colour and shall be replaced to match the existing. The Contractor shall submit a mix design of the dagha (cement) joint filling for approval before application.

The contractor shall arrange for walls to be inspected by the Engineer's Representative before application of the water repellent, but after pressure cleaning of the walls.

The water repellent should be applied by brush or through a low pressure knapsack sprayer. Application should commence from the highest point of the surface and work down the surface. Some run-down of the coating is permissible but should not exceed 250-300 mm. A second coat may be given but only after at least two hours drying time between coats.

Avoid working in full sunshine to achieve maximum penetration. Confine activities to the shadow side of the structures.

Application temperature shall be +/- 5o to +30o, and shall not be applied if rain is imminent.

The penetrating silane / siloxane based water repellent shall be applied to cover 3 – 5 m2 per litre per coat. The water repellent shall be applied in two coats.

The penetrating silane / siloxane based water repellent shall be applied in accordance with the instructions of the supplier.

BD 03.05 WALL TILING

BD 03.05.01 General

Tiling shall comply with the requirements of SANS Standard Specification 22 and section 15 of OW 371. The code of practice for the fixing of glazed wall tiles, SANS 10107 and the recommendations of the South African Ceramic Tile Manufacturer's Association (SACTMA) must be adhered to.

All tiled areas must be checked for damaged surfaces or to determine where tile adhesion to subsurface proves to be of non-satisfactory standard. In cases where tiled surfaces need to be redone, proper care shall be taken in removing all damaged tiles, as well as any adhesive remains on the subsurface.

Matching of existing size and colour should be pursued wherever possible.

BD 03.05.02 Glazed wall tiling

White glazed tiles 150 x 150 x 5 mm thick, first grade, must be laid in a cement-based powder adhesive, strictly in accordance with the manufacturer's specification. Drying periods for backgrounds and substrates must be strictly adhered to. All tiles must be correctly bedded. This can be achieved by using a 6 mm square notched wall trowel to spread the fixative to the required thickness of 6 mm. Bed the tiles dry and move them firmly into position, ensuring that they are in proper overall contact with the bed and form an even surface.

A minimum of 2 mm grouting joints shall be allowed between tiles. Under no circumstances should the tiles be butt-jointed. Do not fill joints between tiles until at least 24 hours after the tiles have been bedded. Ensure that the joints are free of tile adhesive residue and any foreign matter. Fill joints with waterproofed white cement. Existing joints must be cleaned and refilled with new white cement.

BD 03.05.03 Ceramic wall tiling

Glazed ceramic wall tiles 230 x 115 x 11, 5 mm thick, with grade 1 acid resisting quality finish are to be used. Apply an approved epoxy grout into the tile joints and finish off with a wetted nosing tool to a smooth glazed finish. Ceramic tiles include special tiles, such as bull nose and corner tiles. Repairs include replacing damaged tiles and pointing between tiles with an approved epoxy grout.

BD 03.05.04 Corner protectors

Install 75 x 75 x 5 mm thick aluminium angle corner protectors to external vertical wall corners for protection with 8 mm diameter impact nails x 80 mm long @ 300 mm c/c to a maximum height of 1,6 m. Seal the interface gap with approved silicone.

Install for abattoirs and dairies 75 x 75 x 3 mm thick stainless steel grade 304 angle corner protectors, polished to a No 2B finish with a grit 180, to external vertical wall corners. Fix the corner protectors with 8 mm diameter impact nails x 80 mm long @ 300 mm c/c to a height of 1,8 m. The interface gap must be sealed with an approved polyurethane sealant.

BD 03.05.05 Expansion joints

Expansion joints for glazed wall tiling shall be provided at 3,5 m centres maximum (vertically and horizontally). The joints shall be 5 mm wide. Prepare the joints by cleaning them thoroughly. The joints shall be primed and sealed with an approved one component 5 x 5 mm white polyurethane joint sealant.

Expansion joints for ceramic wall tiling shall be provided at 4 m centres maximum (vertically and horizontally). The joints shall be 10 mm wide maximum. Prepare the joints by cleaning them thoroughly. The joints shall be primed and sealed with approved one component 10 x 10 mm white polyurethane joint sealant.

BD 03.06 WINDOWS

BD 03.06.01 General

All windows shall be inspected to assess the level of workability, paying special attention to hinges, handles, stays, catches, etc. Should any window be found unsuitable due to damage to the frame, opening section or any other part thereof, such window shall be replaced.

The Engineer shall take great care to make sure that the appropriate waterproofing details are applied strictly to ensure adequate protection against any water penetration.

BD 03.06.02 Steel windows

The Engineer shall inspect for any deficiencies in residential and industrial type steel windows and cell windows. Where necessary, windows shall be serviced and repainted in accordance with Technical Specification BJ: Paintwork.

BD 03.06.03 Burglar bars to steel windows

Where manganese bars are incorporated in the fixed mullions of the windows, this shall be done in such a way that the bars are not wider apart than 15 cm/centre. The bars shall have at least a section of 30 x 16 mm, penetrating at least 100 mm in the lintels and sills. Heavy duty burglar bars shall be 15 mm diameter or 12 mm square. Loose burglar bars shall be site welded to the window frames.

BD 03.06.04 Timber windows

All wooden windows are to be inspected and treated according to the condition of the timber as stipulated in Technical Specification BJ: Paintwork.

BD 03.06.05 Aluminium windows

When working with mortar or plaster great care shall be taken to protect all aluminium sections from staining by applying a film protector or motor oil on the aluminium surface.

BD 03.07 GLAZING

BD 03.07.01 Glass

Cracked and broken glazing shall be replaced. The glazing and fixing of glass in buildings shall be carried out strictly in accordance with SANS Code of Practice 0137.

BD 03.07.02 Putty

Care shall be taken to remove all chipped, flaked or damaged putty. The Engineer shall indicate on site which putty must be replaced.

All new putty shall comply with the requirements of the SANS Standard Specification 680. The putty shall be delivered on the site in sealed containers marked with the SANS mark.

Type I putty as specified shall only be used for glazing in wood sashes and Type II only in steel sashes.

Paintwork on putty shall not commence until putty has properly dried out, which may necessitate the addition of an accelerating agent. The Contractor shall therefore take programming of trades in Port of Entry areas into consideration.

BD 03.08 DOORS

BD 03.08.01 General

All existing doors shall be inspected for the general condition and integrity of hinges, locking mechanisms, etc.

All steel doors shall comply with the requirements of SANS Standard Specifications 727 and 1129 and section 13 of OW 371.

All new external doors are to be fitted with 1½ pair heavy duty hinges.

Door signage, such as door numbers, etc, shall be in accordance with Technical Specification BH: Fittings, and the Schedule of Quantities.

Special attention shall be given to the condition of striker plates and hinges that need to be replaced, or properly secured where possible. Doors shall be painted to the requirements of Technical Specification BJ: Paintwork.

BD 03.08.02 Doors, sidelights and fanlights

All wooden stock doors shall comply with the requirements of SANS Standard Specification 545 and section 8, clauses 8.33 and 8.34 of OW 371.

BD 03.08.03 Flush doors

The Contractor shall inspect all doors, internal and external. Where any door needs to be replaced, such door shall be a 40 mm thick solid laminated door as specified for interior or exterior use and shall be capable of withstanding the raking, deflection, puncture and moisture resistance tests for the desired application.
Unless otherwise specified, face veneer shall be rotary cut, and shall be of the timber specified, or where doors are to be painted, shall be of timber suitable for painting. Painting shall be done in accordance with Technical Specification BJ: Paintwork, and the Schedule of Quantities.

Edge strips for concealing the vertical edges of doors shall be of the same timber as the face veneer and for single doors and hinge edges of double doors not be less than 10 mm thick, and for rebated meeting edges of double doors not less than 20 mm thick. The top and bottom edges of doors showing end grain shall be sealed with lacquer or other suitable material if the edges were disturbed in any way.

BD 03.08.04 Toilet doors in ablutions

Doors showing signs of erosion due to water penetration shall be either replaced or cut short 150 mm from finished floor level. If the existing semi-solid door panel is to be retained, it should be cut short 150 mm from the floor level. A 38 x 50 mm SAP insert must be glued and nailed in at the bottom edge. The steel frame must also be cut short and filled in with grout at the cut edges and fixed to the wall with 2 x 8 mm diameter heavy duty impact nails.

BD 03.09 IRONMONGERY

BD 03.09.01 General

All ironmongery shall comply with the requirements of section 11 of OW 371. All ironmongery shall be approved by the agent/representative before fixing. Articles shall be fixed with screws of similar metal and shall be eased, oiled, adjusted and left in perfect working order on completion.

All ironmongery shall be inspected to assess the level of workability, paying special attention to door handles, locks, door closers, door stops, door catches, fixing of these fittings, etc. Should any of these fittings be found unsuitable due to damage, corrosion, etc, they shall be replaced. Where existing holes in wood are worn out, these holes must be plugged with wood to receive the screws.

Toilet doors in ablutions must be fitted with approved D-type natural anodised aluminium pull handles and 150 x 150 mm plate. Install 15 mm diameter concealed steel roller ball catch with chromium-plated striker plate with circular hole for roller ball catch. Fix this plate to door frame with two aluminium pop rivets.

BD 03.09.02 Door locks

Each lock shall be provided with two keys and no key shall pass a second lock. All mortice locks, mortice latches and night latches, rim and cylinder rim night latches, and escutcheon for locks shall comply with the requirements of the SANS. The Contractor shall supply all screws, etc, required for completion of the work.

BD 03.09.03 Cupboard doors

Where required according to the Schedule of Quantities, built-in cupboard doors in sleeping quarters are to be provided with 2 x angle iron sections of 35 x 80 x 3 mm thick x 10 mm diameter hole for a padlock that must be fixed to the inside of the cupboard door.

Locker doors shall be provided with a 50 x 50 x 5 mm thick mild steel angle x 10 mm diameter hole for a padlock site welded to the locker.

BD 04 DETAIL OF REPAIR WORK

The detail of the work is described in the Schedule of Quantities.

BD 05 MAINTENANCE

No maintenance will be required for walls under this contract.

BD 06 MEASUREMENT AND PAYMENT

BD 06.01 MEASUREMENT AND RATES

BD 06.01.01 General inclusion of costs and specific specifications

Notes:

Where applicable, standard SANS 1200 measurement and payment items shall be used for Earthworks (Small Works) (1200 DA), Site Clearance (1200 C) and Concrete (Structural) (1200 G).

All material scheduled to be removed shall be deemed to be existing damaged materials in small or large sections. All such redundant material shall become the property of the Contractor and must be removed from site immediately.

All new material shall be deemed to be in patchwork and shall be of approved equal quality, colours, profiles, thickness, etc and shall in all cases match the existing materials and shall be fixed (internally or externally) to existing material, frames or surfaces.

All replacement, removal and repair work shall be done carefully as to not damage any adjacent or other material or work. Any damage to other or adjacent materials or areas caused by the negligence of the Contractor shall be repaired by him free of charge.

All work scheduled to be replaced shall be deemed to include for the careful removal of the damaged existing material as a whole or partly, as specified, for the cleaning and preparation of the remaining surface(s), frames, etc as well as for the new material scheduled or specified to replace the damaged material.

All work scheduled to be removed, hacked off, or taken out shall be deemed to include the cleaning and preparation of the remaining surfaces, areas where material were removed, or remaining work to receive new material or work specified.

Repair and service work shall also include all removing, cutting, grinding, cutting into, welding, bending, strengthening, drilling, tightening, fastening, oiling, greasing, adjusting and providing missing or damaged screws or bolts, etc to repair and service or to improve the items or areas as new and to match the existing. The servicing of windows will be measured in number irrespective of the type of window or the amount of opening sashes present in the overall window size. The rates tendered for servicing of windows or similar items shall be deemed to include for servicing all opening sashes and the total overall frame. The rates tendered for servicing of doors or gates shall include the service of all locks, handles etc.

Work scheduled to be realigned and refixed shall be deemed to include all necessary new additional materials, brackets, connector plates, bolts, pip rivets, nails, screws, spacer blocks, clamps, timber, and labour, etc to leave the items as new and totally functional.

All new work are measured net and shall include all cutting, lapping, waste, bending, fixing, corners, mitres, fixing screws, pip rivets, nails, adhesive, grout, putty, etc, as well as cleaning and preparation of surfaces not already prepared as part of removed items, etc. The supply and installation of new window handles, pegs, stays, etc as well as the service of windows shall include for sealing all bolts and screws of handles, stays, etc with epoxy after fixing or tightening into positions. The rates tendered for installation or replacement of burglar bars on window frames shall be

deemed to include for installation or replacement of burglar bars on all opening windows on the total overall frame.

The removal of doors, gates or windows shall include for the removal of all existing locks, handles, striking plates, etc but exclude the hinges, etc, which shall be used for the new replaced items. All repair work (excluding paintwork) around and in the thresholds of new door frames, gates or windows build into existing brickwork in new or existing positions shall be deemed to be included in either the rates tendered for the new replacement item or the removal payment item of the frame, window, etc.

The new doors to toilets and wet areas as specified shall be fitted with rubber door stops, D-profiled pull handle and backplate sets, 15 mm roller ball catches with striking plates and all other ironmongery needed to install the doors complete. All new ironmongery shall be measured and paid for separately.

The new doors to offices, etc, as specified shall be fitted with rubber door stops, 4 lever mortice locksets with handle sets to match existing, striking plates and all other ironmongery needed to install the doors complete. All new ironmongery shall be measured and paid for separately.

All ironmongery installed on the project shall bear the SANS approved trademark and codes. Samples of all ironmongery scheduled must be according to the samples of the Department of Public Works and samples must be handed to the engineer for approval before ordering the material.

All brickwork shall include for damp proofing membranes, galvanized brickwork reinforcement to every third course, wire ties and wall anchors as needed.

Tile work to walls shall include all cutting, spacers, waste, jointing, mitres, corners, epoxy grout and joint filler.

Ordering of certain specified material i.e. NCI industrial type wall tiles needs special and urgent attendance and should be ordered timeously as to prevent any construction delays.

All new glass mirrors shall be silvered float glass copper backed mirrors with polished edges all round and shall, unless otherwise scheduled, be fixed to walls with chromium plated dome capped mirror screws with rubber buffers.

Specific specification : Repairs to galvanised IBR roofs

Repairs to the workshops and storeroom roofs will include the following work and all work must be carried out in accordance with the Technical Specification BA: Roof Coverings.

(a) Inspect the roof for defects.

(b) Fasten loose nuts on hook bolts.

(c) Replace damaged and/or severely corroded washers (allow for ± 30% of all washers to be replaced). The remainder of the existing washers must be painted with an approved rust converter and a grey colour pure acrylic paint system.

(d) Insert sealer strips on all loose side laps.

(e) Stitch side laps together with Leak Plugs for IBR roof cladding (2 between every hook bolt; purlins are spaced at approximately 1,86 m c/c).

(f) Install new 0,8 mm thick apex trim at the workshops for the length of each bay size 616 mm girth (286 + 300 vertical + 20 + 10 vertical) with Craft-Lock type apex trim fixing brackets. The apex trim 4 x bend (1 is a shallow bend) and fixed to roof sheeting with stitching screws and washers, and to 260 mm vertical x 140 mm (at slope) x 25 mm wide x 2,5 mm thick with 25 mm lip galvanised bracket. The galvanised bracket to be screwed and fixed to roof cladding in trough with 2 galvanised gutter bolts. The spacing of the brackets is 1029 mm. 150 mm overlap fixed and sealed with 2 rows of pop rivets and 2 rows of silicone. Bend up trough to form dam.

(g) Side wall flashings: Inspect existing flashings. All loose flashings must be sealed with two rows of silicone and stitched together with no.10 stitching screws. Counter flashing to be sealed with silicone in brick wall. Existing sealant to be removed. Prepare groove to manufacturer's specifications to receive new joint sealant.

(h) Ridge flashings: Inspect existing flashings. All loose flashings must be sealed with two rows of silicone and stitched together with no.10 stitching screws.

(i) Holes (small diameter) in cladding to be sealed with Leak King plugs.

(j) Replace existing galvanised gutters and down pipes with new 125 x 100 x 0,8 mm thick Chromadek gutters with 100 x 100 x 0,8 mm thick Chromadek rainwater down pipes spaced at approximately 6 to 7 m intervals.

Specific specification : Repairs to concrete gutter at workshops

(a) The existing ± 305 mm x 400 mm deep concrete box gutters must be waterproofed with a fully bonded waterproofing system to Technical Specification BC: Waterproofing. Prepare the existing cement screed surface by cleaning it and replacing decayed cement screed with new screed. The waterproofing membrane must be dressed over the top ends of the concrete upstand beams of the gutters and down into down pipes. All sharp concrete corners must be chamfered adequately to suit waterproofing membrane requirements.

(b) The existing expansion joints in the box gutter must be cleaned and prepared to receive joint sealant. The edges of the concrete must be chamfered to comply with waterproofing manufacturer's requirements. Insert 35 mm diameter "Cordex" or equivalent approved backing cord for 25 mm wide joint. Prime joint and seal joints with 25 mm wide x 15 mm thick approved poly-urethane joint sealant applied strictly according to manufacturer's specifications. The top surface of the joint sealant must be recessed adequately into joint to allow for a closed cell polyethylene foam strip that will accommodate movement of the waterproofing membrane.

Dressing to expansion joint will comprise of additional strips of reinforced waterproofing membranes that are lapped and sealed to manufacturer's specifications. The Contractor must submit detail for approval to the Engineer prior installation.

Specific specification : Repairs to roller shutter doors

(a) Replace the whole bottom T-bar including the bottom ± 17 galvanised slats of the existing roller shutter doors with a new galvanised T-bar (bottom rail) with neoprene weather strip. The Contractor must measure the width of the door (approximately 3000 mm) and the opening width of the wicket door prior ordering the new bottom T-bar and new galvanised slats (± 76 mm high x 1,2 mm thick). When the new bottom T-bar has arrived on site, the Contractor must remove the existing bottom T-bar and slats and slide in the new T-bar and slats.

(b) Provide and insert end locks on the ends of door curtains.

(c) Repairing shall include fixing of missing bracket bolts, screws and pins, brackets, fittings such as locks, loose rachet and pawls, and brackets. Loose bracket bolts that have broken out of walls shall be replaced with 175 mm long x 12 mm diameter threaded rods that must be anchored to the walls with an approved epoxy grout.

(d) Repairing bent and fixing of damaged steel plates of canopy covers.

(e) Repairing gearbox, gear handle, drive shaft, pinions and bevel gears.

Specific specification: Servicing and adjustments to roller shutter doors

(a) All other door components shall be serviced, adjusted, repaired and replaced, but not restricted to, for the full repair of the complete door installation to a smooth working condition. The door sizes is approximately 3000 mm wide x 3500 mm high. The existing interlocking slats are 76 mm wide.

(b) Servicing shall include cleaning and oiling of hinges, rollers, bearings, gears, channel guides and locks. Interlocking slats of the roller shutter curtains shall only be washed with a high-pressure water jet and detergent to remove all dirt, grease, etc.

(c) Adjusting, fixing and realigning of door guides. The existing channel guides, approximately 76 mm wide shall be bent straight to allow free and smooth movement of the roller shutter door slats. The Engineer shall give the necessary instructions where severely damaged channel guides must be replaced.

(d) Adjusting and balancing torsion springs, barrel collar and counter balance.

Specific specification : Welding of thin steel plates

Thin steel plates covering the external side of doors must be welded to the door frame members. The existing paint must be removed from the welding areas prior to site welding. A coded or experienced welder must submit the proposed welding procedure to the Engineer for approval. The aim of the site welding is two fold, viz to fix the steel plate to the frame and secondly, to prevent water ingress into the inside of the door. The perimeter of the individual plate sections of the door must be sealed with continuous impervious welds.

BD 06.02 SCHEDULED ITEMS

NEW WORK

BD.01 Doors and windows:

(a) (Type of doors, windows, locks, etc and material indicated):

(i) Description of item..... Unit : number

The unit of measurement shall be the number of doors, windows, locks, etc installed complete as specified.

The tendered rates shall include full compensation for the manufacturing and installation of the steel doors, windows, locks, frames, etc complete with hinges, handles, locks, barrel bolts, retaining devices, door stops, stays and any other work necessary to complete the work as specified, scheduled or as shown on the Drawings. The tendered rates for windows shall also include full compensation for glazing, window sills and damp-proof sheeting as specified or to match existing.

BD.02 **Wall & Floor panelling:**

(a) Description of material to be used:

(i) Description of item and/or position to be fixed ..... Unit m, m^2, number

The unit of measurement shall be the number, metre, etc for each item as scheduled.

The tendered rates shall include full compensation for all costs of material, waste, labour, plant, transport, delivery, access, scaffolding, fuel, etc to install the material as specified and to match the existing to the Engineer's approval.

BD.03 **Joinery:**

(a) Items measured by number:

(i) Doors, etc (type and size indicated).....Unit: number

(ii) Etc for other items measured by number

(b) Items measured by linear metre:

(i) Skirting, etc (type and size indicated)..... Unit: m

(ii) Etc for other items measured by length

(c) Items measured by area:

(i) Eaves covering, etc (type and thickness indicated) .....Unit: m^2

(ii) Etc, for other items measured by area

The units of measurement shall be the number, metre or square metre of each type and/or size of joinery item specified.

The tendered rates shall include full compensation for the supply of all materials, manufacture, cutting, waste, fixing and installation of the joinery items.

BD.04 **Ironmongery, steelwork, glass, wall finishings, etc:**

(a) Measured by number:

(i) (Description of item) .....Unit: number

(ii) Etc

(b) Measured by linear metre:

(i) (Description of item) ..... Unit: m

(ii) Etc

(c) Measured by area:

(i) (Description of item) ..... Unit: m^2

(ii) Etc

The unit of measurement shall be the number, metre or square metre as applicable to each item.

The tendered rates shall include full compensation for manufacturing, providing and installing each item to new or existing steel, wood or plaster complete as per specifications, drawings, descriptions as scheduled or as the existing and shall include for all labour, material, waste, plant, transport, delivery, access, scaffolding, fuel, etc to the Engineer's approval.

ALTERATION WORK

BD.05 **Corrective work to existing structures:**

(a) Indicate if repairs, replace, alterations, removal or sealing, etc:

(i) Description of individual items to be repaired, altered, removed, sealed, etc ..... Unit: m^3, m^2, m, number

The unit of measurement for items repaired, replaced, altered, removed, sealed, etc shall be the cubic metre, square metre, metre or number for each item as scheduled.

The tendered rates shall include full compensation for all costs to repair, replace, refix, remove, cutting into, re-align, taking off, temporary store, etc as specified in the Standard and Technical Specifications and shall allow for all necessary labour, plant and new material needed to do the specified work and to leave the scheduled items as new and to the approval of the Engineer. Refer also to the general inclusion of costs in BD 06.01.01.

TECHNICAL SPECIFICATION

BE FLOORS

CONTENTS

BE 01 SCOPE
BE 02 STANDARD SPECIFICATIONS
BE 03 VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS
BE 04 DETAIL OF REPAIR WORK
BE 05 MAINTENANCE
BE 06 MEASUREMENT AND PAYMENT

BE 01 SCOPE

Floors shall mean the scope of work to repair and maintain materials and components such as removal of existing floors and installation of new floor coverings, skirting, screeds, concrete floors and paving. This specification does not include work related to metalwork and paintwork, which are specified elsewhere.

This specification covers the removal of existing floor coverings, screeds and concrete surface beds, the repair of existing floor coverings, screeds and concrete surface beds. This specification also covers the supply, delivery and installation of new floor coverings, screeds and concrete surface beds for various types of buildings.

The complete scope of repair work shall as described in BE 04: Detail of repair work.

BE 02 STANDARD SPECIFICATIONS

BE 02.01 GENERAL STANDARD SPECIFICATIONS

The latest edition, including all amendments up to date of tender of the following specifications, publications and codes of practice shall be read in conjunction with this specification and shall be deemed to form part thereof:

OW 371		-	Specification of Materials and Methods to be used (Fourth edition, October 1993)
SANS	281	-	Hardwood block and strip flooring
SANS	581	-	Semi-flexible vinyl floor tiles
SANS	786	-	Flexible vinyl flooring
SANS	978	-	Wood mosaic flooring
SANS	10070	-	The laying of thermoplastic and similar types of flooring
SANS	10043	-	The laying of wood floors
SANS	10186	-	The laying of textile floor coverings
SANS	1449	-	Ceramic wall and floor tiles

BE 02.02 ADDITIONAL SPECIFICATIONS

Technical Specification BF: Structural concrete
Technical Specification BG: Metalwork

BE 02.03 OCCUPATIONAL HEALTH AND SAFETY ACT

The Contractor shall be required to comply with the Occupational Health and Safety Act 85 of 1993, Construction Regulations 2014 and related regulations. Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

BE 03 VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS

BE 03.01 ADDITIONAL REQUIREMENTS FOR REPAIR OF FLOORS

BE 03.01.01 Floor coverings

Existing floors shall be inspected to determine the extent of any damaged floor areas. The existing floors and other building elements shall be protected from damage during the progress of any repair work and on completion shall be cleaned and handed over in a perfect condition. Only skilled workmen experienced in laying any type of floor finishes shall carry out the work.

BE 03.01.02 Preparation of floor slab and surface beds for new floor screeds

The existing concrete screed shall be removed in patches designated by the Engineer.

All laitance on the surface of the existing surface bed must be removed completely. Mechanised plant such as scabblers or abrasive blasters must be used. The Contractor shall take all necessary precautions to keep dust pollution to a minimum inside the building during the breaking out and removing of existing concrete screeds, as well as during the preparation of the existing concrete surface bed.

After the mechanical cleaning of the slab surface to expose the coarse aggregate, all dust and debris must be removed, and the surface must be thoroughly wetted and kept wet for at least 12 hours before application of the new concrete screed.

BE 03.01.03 Surface preparation of existing floor screeds for new floor coverings

The following procedure is suggested where vinyl tiles were laid with bitumen adhesive:

(a) The Engineer will specify the where existing vinyl tiles are to be removed.

(b) The bitumen must be removed mechanically and/or chemically. Remove as much bitumen and other contamination as possible by scraping. Bitumen can be heated to soften it.

(c) Sweep or vacuum sub-floor thoroughly to remove dust and grit.

(d) An approved solvent based degreasing and cleaning compound can be used to remove the bitumen chemically. The Contractor shall ensure the safety of the workers and the building against possible fire.

(e) The concrete surface must be smoothened. Even the surface with Pavelite or approved equivalent before laying the new vinyl tiles. The Pavelite must be applied in accordance with the manufacturer’s specifications.

(f) Vacuum clean the floor surface again before the adhesive is applied to lay the vinyl tiles.

BE 03.01.04 Cement screed

Cement screed shall be carried out in accordance with clause 14.18 of OW 371. The Engineer shall determine which existing cement screeds are to be replaced. The cement screed shall have a maximum thickness of 30 mm. Where required the cement screed shall be modified with an approved alkali compatible acrylic emulsion by preparing the cement screed with a mixture of the latex and water in the required ratio.

Before the new screed is applied, remove all surface water from the slab. Apply a bond coat to the slab/surface bed, consisting of a 1:1 mix of cement and clean fine sand with just enough water to provide the consistency of slurry. Mix in equal parts an approved alkali compatible acrylic emulsion specially modified for use in cement mortars with water, and add Portland cement to form the slurry. Spread the bond coat evenly using a stiff fibre brush. Do not leave standing pools. Place screed in good time (before the bond coat dries out). The screed must be laid and compacted in one layer.

Curing should commence as soon as the finishing operations have been completed and should be continued for at least 7 days. The Engineer must approve the method of curing.

Joints must be formed in the screed at all existing contraction and expansion positions, as well as at intermediate positions at 3 m spacing maximum.

BE 03.01.05 Concrete screeds

(a) General

Concrete screeds shall have a minimum thickness of at least 50 mm. The Engineer shall determine the areas of which the concrete screeds need to be replaced.

Only ordinary Portland cement, CEM 1 42,5 in accordance with SANS ENV 197-1, shall be used.

Coarse aggregate maximum size: 10 mm
28-day cube strength: 35 MPa.

The use of an approved plasticizer is recommended to reduce the water content of the mix to the absolute workable minimum.

The mix design must be submitted to the Engineer in advance for approval.

Four sets of six test cube samples shall be taken for every factory for the testing of the compressive strength of the concrete.

(b) Concrete floor hardener

Concrete natural non-ferrous aggregate floor hardeners shall strictly be applied in accordance with the manufacturer's specification and under his supervision. Note: The Contractor shall furnish a certificate of compliance, together with a written guarantee after completion.

(c) Compressive strength

At 7 days: 50 MPa
At 28 days: 70 MPa

All other aspects of the construction of new concrete screeds shall be adhered to as specified in Technical Specification BF: Structural concrete.

BE 03.01.06 Laying of material (ceramic excluded)

The laying of vinyl and similar flooring material in tile and sheet form and the fixing of plastic skirting, nosing, etc, shall be carried out in accordance with SANS 1043 and section 10, clause 10.3 of OW 371.

The laying of wood block and wood mosaic flooring shall be carried out in accordance with SANS 1043 and section 10, clause 10.2 of OW 371.

The laying of textile floor coverings shall be done in accordance with SANS 10186.

Vinyl floor tiles shall be laid with continuous joints in both directions. Tiles shall be cut with a "jointer" at saw and expansion joints. Tiles laid over these types of joints will not be permitted. Only latex-resin type adhesive shall be allowed to glue tiles to the concrete screed or surface bed.

BE 03.01.07 Granolithic screed finish

Granolithic screed finish to floors, treads of steps, thresholds and similar surfaces, unless otherwise specified, shall not be less than 25 mm thick. The granolithic screed shall be composed of three parts granite, or other approved hard stone chips, or approved hard, coarse sharp washed granite or quartzite sand, half part clean sand and one part of cement, hand or mechanically trowelled to a true and smooth surface. No dry cement powder, grout or wet slurry mix shall be applied to the surface.

New granolithic screed shall be laid before the concrete surface bed or floor matures in order to allow for proper binding. If this is not possible, then the top of the surface bed or floor shall be hammered, chipped and then cleaned with a wire brush and a coat of neat cement grout applied immediately before the granolithic is laid.

The granolithic shall be laid in panels not exceeding 6 m² in area and jointed to lines of panels with V-joints. The joints between the panels shall coincide with joints in the concrete surface bed or floor.

Granolithic finish to stair risers, sides of curbs and other vertical surfaces shall, unless otherwise specified, not be less than 12 mm thick.

All granolithic work shall be done by experienced workmen only and shall be protected from damage caused by rain or other extreme weather for 12 hours after being laid. Protection shall be provided against too rapid drying whilst hardening by means of covering with wet sacks or other suitable material. The screed shall also be protected from damage and discoloration during the progress of the remaining work.

Edges of granolithic floor butting against different floor finishes and edges of margins, etc, shall be true and sharp, and shall be protected by fixing temporary wood strips which shall remain in position until the laying of the adjoining floor has commenced.

Where a non-slip granolithic floor finish is required, the granolithic shall be laid as specified above. Alundum grit shall then be sprinkled over the surface at the rate of 1 kilogram per square meter, lightly tamped in and allowed to set.

BE 03.01.08 Vinyl floor finishes

Existing floors should be inspected and where vinyl tiles need to be replaced, such tiles shall comply with the requirements of SANS 786, and be 300 x 300 x 2 mm thick unless otherwise specified. The flooring shall be of marbled pattern and of an approved colour (to be specified by the Engineer).

Vinyl floor tiles or sheets shall be laid with an adhesive recommended by the manufacturer. All the preparation and work in connection with the laying and fixing of the specified flooring and vinyl skirting shall be done in accordance with SANS 1070 and to the satisfaction of the Engineer.

The flooring shall, where necessary, be cut and neatly fitted against adjoining floors, thresholds, etc. Where required the Contractor shall carefully remove existing timber floor skirting and/or quarter rounds for re-use where vinyl tiles are laid against walls. Reinstate skirting and/or quarter rounds.

Vinyl floor tiles shall, unless otherwise specified, be laid with continuous joints in both directions and vinyl floors shall, unless otherwise specified, be in standard widths with cut sheets at sides of floors as necessary, all to the entire satisfaction of the Engineer.

The vinyl flooring and skirting shall be covered up and protected from damage during the progress of remaining work and on completion be cleaned and, unless otherwise specified, polished with the type of polish recommended by the manufacturer of the vinyl flooring.

BE 03.01.09 Skirting

Loosened hardwood skirting must be cleaned and where necessary removed and/or replaced by 76 x 19 (or 25 mm) mm thick hardwood skirting with one rounded top edge plugged to the wall. Painting shall be in accordance with Technical Specification BJ: Painting.

In selected areas skirting shall be 100 mm high x 6 mm thick unglazed ceramic tiles glued to walls with an approved cement grout. The Engineer shall specify these areas.

Vinyl cove skirting shall be of approved manufacture and colour and, unless otherwise specified, be 70 mm high.

BE 03.01.10 Sealing of vinyl flooring

The newly laid tiles shall, after four days, be scrubbed with a diluted neutral detergent/stripper complying with SANS 825 and rinsed thoroughly. After the floor has dried, apply two coats polymer/acrylic sealer combination containing a minimum of 22 % solids using an applicator pad. Ensure that the surface has set hard before allowing traffic on the floors.

BE 03.01.11 Wood block floors

(a) Replacement of wood block floors

Where required, wood blocks that must be replaced shall, unless otherwise specified, be Clear Grade, Class H with nominal sizes of 75 mm wide, 225 mm long and 20 mm thick, and shall comply with the requirements of SANS 281. Wood blocks that are loose must be re-laid using an approved hot or cold adhesive after the old bitumen has been removed and the surface prepared.

The moisture content of the blocks shall be as specified in the above-mentioned specification, and the blocks shall be treated with timber preservative as specified. The blocks shall, unless otherwise specified, be laid to a basket pattern with an approved hot or cold adhesive and shall be sanded on completion all in accordance with the SANS Code of Practice, SANS 1043 and to the satisfaction of the Engineer

Wood block floors shall be covered up and protected from damage during the progress of the remaining work, and unless otherwise specified, a sealer shall be applied to the final sanded surface and then polished all in accordance with the above-mentioned Code of Practice.

(b) Partial repairs to parquet floors

Only severely loose wood blocks identified by the Engineer shall be repaired. The Contractor shall carefully remove the wood blocks for re-use. Scraping and any other suitable means shall be used to remove the old bitumen. The concrete surface bed or cement screed shall be cleaned from dust and bitumen residue as specified in BE 03.01.02. If the concrete or cement screed is in a poor condition, the poor patches shall be removed according to BE 03.01.04. The Contractor will be allowed to use rapid hardening cement grouts to reduce drying time of concrete and cement screeds in order to suit the working programme. The screeds must be laid at such a level as to enable the workmen to lay the cleaned wood blocks at the same level as the surrounding wood flooring blocks. The cleaned blocks shall be laid in a basket pattern (or the same existing pattern) with approved hot or cold bitumen at the same level as the surrounding blocks. Missing blocks must be replaced.

BE 03.01.12 Sealing of timber floors

Existing timber floors must be mechanically belt-sanded to remove all traces of existing sealer in strict compliance with SANS 1043. Where necessary, existing flooring, skirting and quarter rounds should be temporarily removed. Before applying the new wooden floor sealer, ensure that the surfaces are dry, sanded smooth and free from varnish or oil. Vacuum the dust from the prepared floor surfaces.

Apply three coats of clear, lead free wooden floor sealer with preservative and anti-fungicidal properties according to the manufacturer's specification.

Apply the first coat until an even glossy, wet surface is achieved. Leave to dry thoroughly. Apply at least two other coats in the same way, and finally a fourth and final coat. It is proposed that the Contractor first do a trial section to satisfy himself that he can handle this procedure. The final appearance of the wooden floor must be smooth and have a uniform non-gloss finish.

Reinstate skirting and quarter rounds.

BE 03.01.13 Tiling (general)

Tiles shall be solidly bedded and jointed in cement mortar and, unless otherwise specified, joints shall be 6 mm wide.

The joints in all tiling are to be continuous in both directions. The pointing is to be carried out by well pressing in half-dry cement mortar. Under no circumstances may liquid cement grout be used for pointing.

All tiling shall be properly covered and shall be protected against any possibility of staining, discolouring or any other damage.

At completion, all tiling is to be exposed, checked for damage, repaired where necessary and cleaned off with soft soap and cold water and left in a perfect condition. The application of oil on tiling is not allowed.

BE 03.01.14 Ceramic and quarry floor tiles

(a) General requirements

The Engineer shall determine which tiles need replacement. The existing floor screed and floor tiles must be removed in patches and/or areas as determined by the Engineer.

Ensure that the base for floor tiling is rigid, stable and level unless required to have a fall in one or more direction(s). The surface preparation and cement screed (if required) are described in BE 03.01.03 and BE 03.01.04 respectively.

When proprietary brand adhesives are being used for fixing ceramic floor tiles it is essential that the surface to which the tiles are to be fixed is clean, dry, flat and true.

Lay approved unglazed ceramic split floor tiles (230 x 115 x 11,5 mm thick and of a selected or matching colour) in professional floor grouting with 8 - 10 mm wide joints. The floor grout must be applied with a 10 mm square notched floor trowel evenly over an area not exceeding 1 metre at a time. Coved skirting tiles including external and internal skirting corners must be laid against walls in abattoirs. Setting out must be done correctly. The finished installation must be level plumb and true unless specified otherwise. In abattoirs the floor tiles must be laid to specified falls.

Mortar beds for dust-pressed tiles and quarry tiles shall be formed with a slurry of 1:1 cement and clean fine sand to a thickness of about 3 mm on an area not exceeding 1 metre at a time. The joints will be 6 - 8 mm wide depending on the size of the tile.

The tiles must be laid in professional cement-based powder adhesive, strictly in accordance with the manufacturer's specifications. The Code of Practice for the fixing of tiles in accordance with SANS 1449 and the recommendations of the South African Ceramic Tile Manufacturer's Association (SACTMA) shall be followed. Important points to be taken into consideration is are summarised below:

(i) Sufficient time must be allowed between building operations.
(ii) Drying periods for backgrounds and substrates must be strictly adhered to.
(iii) No tiling may commence prior to the prescribed time.
(iv) All tiles must be correctly bedded. The tiles must be properly bedded into a fixative that is spread evenly to the required thickness using a square notched rubber mallet (10 mm for ceramic tiles). Bed the tiles dry and move firmly into position, ensuring that they are in proper overall contact with the bed, and form an even surface.
(v) A minimum of 6 - 10 mm grouting joints must be allowed between extruded and split tiles (3 mm minimum for pressed tiles). Ensure that the joints are free of tile adhesive and any foreign matter.
(vi) Tiling installation: Setting out and finished installation must be done correctly.

(b) Filling of joints

Do not fill joints between tiles until at least 24 hours after the tiles have been bedded. Before applying the joint epoxy grout ensure that the joints are free of tile adhesive residue and any foreign matter. Apply the approved epoxy grout into the tile joints. The finishing-off must be completed with a wetted nosing tool or spatula so that a smooth glazed surface finish can be achieved. Application of the epoxy grout must be done strictly in accordance with the manufacturer's specifications. Finally, the tiles must be thoroughly cleaned.

BE 03.01.15 Movement joints in tiling

(a) General requirements

Movement joints are to be provided in tile work due to moisture expansion, thermal expansion and contraction, and crack control at existing expansion joints in the surface bed.

(i) Provide movement joints in the tile work, screed and bedding down to the concrete surface bed or slab. The spacing of these joints depends on the position of existing joints, column and wall layouts and slab thickness. The maximum spacing of joints should be limited to 30 times the slab (surface bed) thickness or 4,5 m, whichever is the lesser. The length-to-width ratio of tile panels should be limited to between 1,0 and 1,5.
(ii) Provide isolation joints around the perimeter of the floor, around columns, walls and other fixed structural elements.
(iii) Joints shall be aligned with no offsets. Irregular shape tile panels must be avoided. Where included angles are unavoidable, it should be less than 60 degrees.
(iv) The width of the joint shall be 6 mm minimum and 10 mm maximum. Provide an approved closed-cell expanded polyethylene foam joint filler with a hinged temporary blocking piece in the movement joints. The size of the blocking piece must be the same as the joint width.

(b) Joint sealing

The joints shall be prepared and primed prior the application of the joint sealant.

The liquid sealant in joints shall be an approved one part grey polyurethane sealant with a shore hardness of A45 and an elongation of 400 %. The manufacturer's specifications must be strictly followed.

(c) In abattoirs

Clean and dry all tile surfaces. All loose material must be removed by means of a wire brush or by water while all tile adhesives are cleaned from the edges of the tiles.

Ensure that all traces of release agents, curing compounds and existing joint sealant compounds are removed. Install a suitable closed-cell expanded polyethylene bond breaker cord in the expansion and isolation joints after which the complete substrate is primed with a component solvent free primer which penetrate into the tile and pull all dust particles with it. Proceed with the final application of an approved one part grey polyurethane sealant with a shore hardness of A45 and an elongation of 400 %. The manufacturer's specifications must be strictly followed.

BE 02.02 PAVING

Repairs to paving shall include the improvement of existing paving, drainage channels and the replacement of paving that can not be repaired. Different paving types exist, e.g. concrete, precast paving segmental and regular blocks, bricks and slasto. This specification only covers pedestrian paving around buildings.

The Engineer shall identify the paving areas that are to be repaired. Defects to paving will include but not be limited to the following aspects:

(a) Failure of subbase material and subsidence of sub-soil due to excessive water erosion;
(b) Broken and severely damaged paving;
(c) Distorted and disturbed paving;
(d) Drainage problems, e.g. ponding of water on the paving and in drainage channels, incorrect falls, etc;
(e) The omission of edge restraint;
(f) Intrusion of weed or hostile root penetration.

BE 03.02.01 Preparing foundation

If the subbase and/or subgrade have failed, this soft and unstable material shall be replaced. Existing paving must be carefully removed and stack for re-use. The new earth filling shall be of inert material, having a maximum plasticity of 10, free from large stones, etc, spread, leveled, watered and compacted in layers not exceeding 150 mm thick to a density of 95% of modified AASHTO density. Cement stabilization to improve the existing subgrade may be considered to improve the characteristics of the material. The blocks shall be laid true to line, levels and grade on a 25 mm thick layer of approved bedding sand. The bedding sand must not be used to fill hollows in an uneven subgrade or subbase surface. Where specified, plastic sheeting must be provided below the bedding sand layer. Refer also to BE 03.02.06.

The Contractor shall be responsible for carrying out all necessary process control tests on the density and moisture content of the completed subgrade, subbase, etc, to ensure that the required compaction is being attained.

BE 03.02.02 Laying of segmental block paving

The existing blocks shall be pre-selected for re-use. Broken and severely damaged paving blocks shall be replaced. New paving blocks shall comply with SANS 1058 Class 30 compressive strength. All blocks shall be laid true to line and level. Care shall be taken to ensure that joint lines are straight and square. The blocks shall have a minimum thickness of 60 mm.

After laying the blocks, the paving shall be compacted by means of vibrating plate compactor with joints between the blocks filled in, after compaction, by sweeping in fine sand. The jointing sand shall have a pass of 1,18 mm sieve and contain 10-50 % material passing the 75 micron sieve. The sand shall be free of all soluble salts or contaminants likely to cause efflorescence or staining.

Areas against curbs, manholes, etc, that require infilling and which exceed 25 % of a full block unit shall be filled with units cut to size using a mechanical or hydraulic guillotine, bolster or angle grinder. Infill areas constituting less than 25 % of a full block area and are of 25 mm minimum dimension shall be filled with 25 MPa concrete. Smaller areas shall be filled with 1:4 cement mortar.

BE 03.02.03 Laying face brick pavers, precast concrete blocks and slasto

The existing blocks shall be pre-selected for re-use. Broken and severely damaged paving blocks shall be replaced. All blocks shall be laid true to line and level. Care shall be taken that joint lines are straight and square. Slasto shall be laid in the same pattern to match existing.

After laying the blocks, the paving shall be compacted by means of vibrating plate compactor. Clean the top of the blocks before and after compaction. Thoroughly wet compacted area after compaction and leave 24 hours to dry. The joints between the blocks must be filled in, after compaction, with a 1:4 cement mortar. The joints shall be pointed with a steel tool to a smooth surface finish.

BE 03.02.04 Laying of cast *in situ* concrete paving and drainage channels

Severely cracked and/or damaged concrete paving and drainage channels shall be replaced. The Engineer shall indicate which panels and sections of drainage channels are to be removed. Cutting out will be done with an angle grinder or saw cutting machine. Concrete panels must be removed in sizes where the ratio of the sides does not exceed 1:1,5. The foundation material must be improved as specified in BE 03.02.01.

New concrete panels and drainage channels must be cast with a compressive strength of 25 MPa. Concrete paving to the specified thickness must be finished off with a smooth wood trowel surface finish or must match the existing surface finish.

Edges must be finished off with a steel nosing tool with a radius of 5 mm. Expansion joints must be provided where specified. Drainage channels must be cast in lengths not exceeding 1 metre. Channels must be finished off to have a smooth steel trowel finish.

BE 03.02.05 Precast concrete edge beams, curbs and channels

Edge restraints shall be installed before paving commences. Edge restraints may be cast *in situ*, or consist of precast units. Precast edge blocks shall have dimensions of 75 mm wide x 300 mm deep. Cast *in situ* beams with 25 MPa concrete shall have dimensions of 300 x 300 mm and cast in lengths on exceeding 1 metre.

Precast concrete curbs and channels shall comply with SANS 927, generally in 1 metre lengths and finished smooth from the mould on exposed surfaces. Curbs and channels shall be bedded on and jointed in 1:3 cement mortar and pointed with keyed joints. Bases to curbs shall be Class B prescribed mix of unreinforced concrete.

BE 03.02.06 Weed control

Two types of weed killing shall be carried out:

(a) Mixing weed killer to subbase for rehabilitated paving;
(b) Spraying existing paving excluding concrete paving.

After the base course has been approved and the curbing completed, the prepared base must be treated with a weed killer similar or equal to HYVAR X at a rate of 4 kg/m². Plastic sheeting with a thickness of 375 micron shall be laid to prevent the penetration of grass underneath the segmental paving.

BE 03.02.07 Site clearance

Excess sand and all other debris shall be removed before the pavement is opened to traffic. The site shall be left in a tidy condition.

BE 04 DETAIL OF REPAIR WORK

The detail of the scope of work is described in the Schedule of Quantities.

BE 04 MAINTENANCE

No maintenance will be required for floors under this contract.

BE 06 MEASUREMENT AND PAYMENT

BE 06.01 MEASUREMENT AND RATES

BE 06.01.01 General inclusion of costs and specific specifications

Notes:

Where applicable, standard SANS 1200 measurement and payment items shall be used for Earthworks (Small Works) (1200 DA), Site Clearance (1200 C) and Concrete (Structural) (1200 G).

All material scheduled to be removed shall be deemed to be existing damaged materials in small or large sections. All such redundant material shall become the property of the Contractor and must be removed from site immediately.

All new material shall be deemed to be in patchwork and shall be of approved equal quality, colours, profiles, thickness, etc. and shall in all cases match the existing materials and shall be fixed (internally or externally) to existing material or surfaces.

All replacement, removal and repair work shall be done carefully as to not damage any adjacent or other material or work. Any damage to other or adjacent materials or areas caused by the negligence of the Contractor shall be repaired by him free of charge.

All work scheduled to be removed, hacked off or taken out shall be deemed to include the cleaning, removing of contact glue or bitumen and preparation of the remaining surfaces, areas where material were removed, or remaining work to receive new material or work specified.

Repair work shall also include all cutting, grinding, cutting into, welding, bending, strengthening, drilling, etc. to repair or to improve the items or areas as new and to match the existing.

Work scheduled to be realigned and refixed shall be deemed to include all necessary new additional materials, brackets, connector plates, bolts, pip rivets, nails, screws, spacer blocks, clamps, timber, and labour, etc. to leave the items as new and totally functional.

All floor surfaces scheduled to be cleaned and sealed shall include for stripping the floors from any fats, grime, dirt, oil and other deposits. Replacement of grout to ceramic and clay floor tiles shall also be included where necessary as per the tendered rate. Sealing of existing vinyl floor tiles shall be done in accordance with Technical Specification BE 03.01.10.

All new work are measured net and shall include all cutting, lapping, waste, bending, fixing, corners, mitres, fixing screws, pip rivets, nails, adhesive, grout, putty, etc, as well as cleaning and preparation of surfaces not already prepared as part of removed items, etc.

Tile work to floors shall include all cutting, spacers, waste, jointing, mitres, corners, epoxy grout and joint filler.

Ordering of certain specified materials i.e. NCI industrial type floor tiles needs special and urgent attendance and should be ordered timeously as to prevent any construction delays.

BE 06.02 SCHEDULED ITEMS

NEW WORK

BUILDING WORK

BE.01 **Floor screeds:**

(a) (Thickness indicated) .....Unit: m^2

(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 the construction of the floor screeds, including the supply of all materials, mixing, laying, finishing, the forming of nosing, reading, skirting, etc.

BE.02 **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 linear metre:

(i) Skirting (size indicated) ..... Unit: m

(ii) Etc. for other items measured by length

(c) Items measured by area:

(i) Eaves covering (type and thickness indicated) .....Unit: m^2

(ii) Etc. for other items measured by area

The units of measurement shall be the number, metre or square metre of each type and/or size of joinery item specified.

The tendered rates shall include full compensation for the supply of all materials, manufacture, cutting, waste, fixing and installation of the joinery items.

BE.03 **Floor tiling and finishes, etc:**

(a) Measured by number:

(i) (Description of item) ..... Unit: number

(b) Measured by linear metre:

(i) (Description of item) .....Unit: m

(c) Measured by area:

(i) (Description of item) .....Unit: m^2

The unit of measurement shall be the number, metre or square metre as applicable to each item.

The tendered rates shall include full compensation for manufacturing, providing and installing each item complete as per specifications, drawings, descriptions as scheduled or as the existing and shall include for all labour, material, waste, plant, transport, delivery, access, scaffolding, fuel, etc. to the Engineer's approval.

ALTERATION WORK

BE.04 **Alterations and repairs to existing structures:**

(a) Indicate if repairs, alterations, removal or sealing, etc:

(i) Description of individual items to be repaired, altered, removed, sealed, etc ..... Unit: m^3, m^2, m, number

The unit of measurement for items repaired, altered, removed, sealed, etc. shall be cubic metre, square metre, metre or number as scheduled.

The tendered rates shall include full compensation for all costs to repair, refix, remove, cutting into, realign, taking off, temporary store, etc. as specified in the Standard and Technical Specifications and shall allow for all necessary labour, plant and new material needed to leave the scheduled items as new and to the approval of the Engineer. Refer also to the general inclusion of costs in BE 06.01.01.

TECHNICAL SPECIFICATION

BH FITTINGS

CONTENTS

BH 01 SCOPE
BH 02 STANDARD SPECIFICATIONS
BH 03 VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS
BH 04 DETAIL OF REPAIR WORK
BH 05 MAINTENANCE
BH 06 MEASUREMENT AND PAYMENT

BH 01 SCOPE

Fittings shall mean the scope of work to repair materials and components related to cupboards, shelving, signage and counters.

The complete scope of repair work shall be as described in BH 04: Detail of repair work.

BH 02 STANDARD SPECIFICATIONS

BH 02.01 GENERAL STANDARD SPECIFICATIONS

The latest edition, including all amendments up to date of tender of the following specifications, publications and codes of practice shall be read in conjunction with this specification and shall be deemed to form part thereof:

OW 371	-	Specification of Materials and Methods to be used (Fourth edition, October 1993)
SANS 929	-	Plywood and composite board
SANS 1099	-	Hardwood furniture timber
SANS 1783-3	-	Softwood timber for industrial use
SANS 1385	-	Kitchen cupboards of steel, composite board and timber

BH 02.02 ADDITIONAL SPECIFICATIONS

Technical Specification BD: Walls
Technical Specification BG: Metalwork
Technical Specification BJ: Paintwork

BH 02.03 OCCUPATIONAL HEALTH AND SAFETY ACT

The Contractor shall be required to comply with the Occupational Health and Safety Act 85 of 1993, Construction Regulations 2014 and related regulations. Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

BH 03 VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS

BH 03.01 ADDITIONAL REQUIREMENTS FOR REPAIR OF FITTINGS

BH 03.01.01 Built-in cupboards

The Engineer shall inspect all cupboards for defects and shall establish which components are to be replaced or repaired. Reasons for replacement will include, but not be limited to:

(a) Severely chipped or damaged block board;
(b) Severely chipped or damaged decorative laminates;
(c) Inadequacy of design, e.g. strength of hinges, failure of door furniture, etc;
(d) Corroded steel elements.

Fixing of defects will include repairing or replacing damaged, corroded and worn-out fittings, e.g. door handles, knobs and hinges, door catches and holders, door locks, cupboard door vents, drawer slide rails, drawer handles, knobs and locks. Moving parts shall be serviced by cleaning, oiling, tightening loose screws, reinstating missing screws or aluminium pop rivets, etc. Refer to BD 03.08 and BD 03.09 of Technical Specification BD: Walls, for repairs or replacements of cupboard doors and ironmongery.

BH 03.01.02 Kitchen cupboards

Kitchen cupboards shall be inspected for defects. Defects will include repairing or replacing damaged, corroded and worn-out fittings, e.g. door handles, knobs and hinges, door catches and holders, door locks, cupboard door vents, drawer slide rails, drawer handles, knobs and locks. Moving parts shall be serviced by cleaning, oiling, tightening loose screws, reinstating missing screws or aluminium pop rivets, etc. Where the baked enamel of steel cupboards is scratched and worn off, the steel surface shall be sanded and painted with an approved gloss epoxy paint to match the existing colour. Severely corroded or damaged steel cupboards shall be replaced with approved new steel cupboards complying with SANS 1385, with the baked enamel complying with SANS 783 Type II.

Damaged kitchen cupboards manufactured from composite board with laminated plastic covering shall be repaired where possible by gluing loose laminated plastic covering or replacing components with new similar matching finished elements.

Damaged kitchen cupboards manufactured from timber shall be repaired by replacing cracked and broken timber components. Painted surfaces shall be varnished with water-resistant varnish (with matching stain) or painted with approved polyurethane paint. Refer to Technical Specification BJ: Paintwork.

All cupboards shall be properly screwed and fixed to walls and floors with suitable corrosion resistant screws and plastic plugs, washers, etc.

Work tops and sinks against walls shall be sealed with an approved white one part polyurethane sealant. The sealant shall be applied strictly according to the manufacturer's specifications. Old worn-out and damaged sealant shall also be replaced. Drop-in sink bowls shall also be sealed with this approved polyurethane sealant. Where the possibility exists that water can penetrate composite board, these joints in the worktops shall also be sealed.

BH 03.01.03 Shelving

The stability of shelves must be checked to determine the occurrence of sagging. Where required, provide adequate support for the specific application, e.g. steel tubing struts, additional timber bearers, steel brackets, etc.

Broken timber shelving shall be replaced with approved wrought hardwood or solid laminated pine varnished or painted to specification. Composite board will not be permitted. Shelves shall be in single lengths. Heads of nails and brass countersunk screws in exposed faces of joinery shall be sunk and pelleted.

BH 03.01.04 Signage

Safety signs shall comply with the requirements of SANS 1186 (1997).
The Engineer shall survey all signage and list those items that prove to be illegible. Signs that need to be replaced shall be done in the same fashion and material as to match similar signs in the same application. The size of the signs shall be as shown on the schedules.

Where required proper and appropriate signage must be provided for door numbers, room size and room description. The size, colour, position on the door, wall, etc., height above floor level of the lettering shall be instructed by the Engineer on site or shown on the schedules. The lettering must be stencilled on to the doors and walls.

All other fire protection signage will be provided for hydrants, hose reels, etc, shall be provided under separate contract.

BH 03.01.05 Counters

The Engineer shall inspect all counters and counter tops for defects and shall establish which components are to be replaced or repaired. Special attention shall be given to the condition of hinges at service hatches.

All joinery liable to be damaged shall be covered with temporary coverings to the satisfaction of the Engineer and special care shall be taken to protect surfaces that are to be varnished.

Where necessary, timber counters shall be sanded down, uneven surface spots filled with an approved wood filler, all blemishes removed and then finished off in order to restore the wood to its original state.

Steel tops that have been damaged excessively shall be replaced.

BH 04 DETAIL OF REPAIR WORK

The detail of the scope of work is described in the Schedule of Quantities.

BH 05 MAINTENANCE

No maintenance will be required for fittings under this contract.

BH 06 MEASUREMENT AND PAYMENT

BH 06.01 MEASUREMENT AND RATES

BH 06.01.01 General inclusion of costs

Notes:

All material scheduled to be removed shall be deemed to be existing damaged materials in small or large sections. All such redundant material shall become the property of the Contractor and must be removed from site immediately.

All new material shall be deemed to be in patchwork and shall be of approved equal quality, colours, profiles, thickness, etc and shall in all cases match the existing materials and shall be fixed (internally or externally) to existing material or surfaces.

All replacement, removal and repair work shall be done carefully as to not damage any adjacent or other material or work. Any damage to other or adjacent materials or areas caused by the negligence of the Contractor shall be repaired by him free of charge.

All work scheduled to be removed or taken out shall be deemed to include the cleaning and preparation of the remaining sections, areas, or work to receive the new material or work specified.

Repair and service work shall also include all removing, cutting, grinding, cutting into, welding, bending, strengthening, drilling, tightening, fastening, oiling, greasing, adjusting, and providing missing or damaged screws or bolts, etc to repair or to improve the items or areas as new and to match the existing. The service of cupboard doors and drawers shall be deemed to include for servicing all locks, hinges, glides, tracks, etc.

Work scheduled to be realigned and refixed shall be deemed to include all necessary new additional materials, brackets, connector plates, bolts, pip rivets, nails, screws, spacer blocks, clamps, timber, and labour, etc to leave the items as new and totally functional.

All new work are measured net and shall include all cutting, lapping, waste, bending, fixing, corners, mitres, fixing screws, pip rivets, nails, adhesive, grout, putty, etc, as well as cleaning and preparation of surfaces not already prepared as part of removed items, etc.

The removal of doors, gates or windows shall include for the removal of all existing locks, handles, striking plates, etc but exclude the hinges, etc, which shall be used for the new replaced items. All repair work (excluding paintwork) around and in the thresholds of new door frames, gates or windows build into existing brickwork in new or existing positions shall be deemed to be included in either the rates tendered for the new replacement item or the removal payment item of the frame, window, etc.

The new doors to toilets and wet areas as specified shall be fitted with rubber door stops, D-profiled pull handle and backplate sets, 15 mm roller ball catches with striking plates and all other ironmongery needed to install the doors complete. All new ironmongery shall be measured and paid for separately.

The new doors to offices, etc, as specified shall be fitted with rubber door stops, 4 lever mortice locksets with handle sets to match existing, striking plates and all other ironmongery needed to install the doors complete. All new ironmongery shall be measured and paid for separately.

All ironmongery installed on the project shall bear the SANS approved trademark and codes. Samples of all ironmongery scheduled must be according to the samples of the Department of Public Works and samples must be handed to the engineer for approval before ordering the material.

BH 06.02 SCHEDULED ITEMS

NEW WORK

BH.01 Joinery:

(a) Items measured by number:

(i) Timber cupboard doors, shelves, complete cupboards, etc (type and size indicated) .....Unit: number

(ii) Etc for other items measured by number

(b) Items measured by linear metre:

(i) Timber rails, planks, frames, shelves, etc (size indicated) ..... Unit: m

(ii) Etc for other items measured by length

(c) Items measured by area:

(i) Pinning boards, shelves, work tops, etc (type and thickness indicated) ..... Unit: m^2

(ii) Etc, for other items measured by area

The units of measurement shall be the number, metre or square metre of each type and/or size of joinery item specified.

The tendered rates shall include full compensation for the manufacturing and supplying of all materials, for transport, labour, cutting, waste, fixing, screws, bolts, clamps, etc and installation of the joinery items.

BH.02 **Steelwork:**

(a) Items measured by number:

(i) Steel cupboard or locker doors, shelves, complete cupboards, etc (type and size indicated)..... Unit : number or units

(ii) Etc, for other items measured by number

(b) Items measured by linear metre:

(i) Steel rails, shelves, frames, etc (size indicated) ..... Unit : m

(ii) Etc, for other items measured by length

(c) Items measured by area:

(i) Shelves, plates, etc (type and thickness indicated) ..... Unit : m^2

(ii) Etc, for other items measured by area

The unit of measurement shall be the number, metre or square metre of each type and/or size of steelwork item specified.

The tendered rates shall include full compensation for the manufacturing, supplying of all materials and transport, and for all labour, cutting, welding, waste, fixing and installation of the steelwork items complete with a red oxide or equal approved steelwork primer or baked enamel paint finishing as specified.

(d) Supply and install Boltless rivet shelving ..... Unit : No

The unit of measurement shall be the number of bays of boltless rivet shelving complete with five shelves supplied and installed.

The unit of measurement shall include full compensation for the ordering, supply, delivery and installation of boltless shelving with a height of 2200mm x 800mm deep x 1200mm wide complete with five shelves and all the necessary accessories to form a neat installation. The minimum thickness of the steel shelves shall be 1.2 mm, the frame shall be manufactured of 1.6 mm steel and the angle upright's of 1.6 mm steel. All steel components shall be degreased; zinc phosphate and polyester epoxy powder coated process to comply with SABS standards for pre-treatment and finished in a grey colour (Colour to be confirmed on site).

The contractor shall provide the details, specifications and proposed layout of the boltless rivet shelving to the Engineer for approval in writing before ordering.

ALTERATION WORK

BH.03 **Alterations and repairs to existing fittings:**

(a) Indicate if repairs, alterations, removal or sealing, etc:

(i) Description of individual items to be repaired, altered, removed, sealed, etc ..... Unit: m^3, m^2, m, number

The unit of measurement for items repaired, altered, removed, sealed, etc shall be cubic metre, square metre, metre or number as scheduled.

The tendered rates shall include full compensation for all costs to repair, refix, remove, cutting into, realign, taking off, temporary store, etc as specified in the Standard and Technical Specifications and shall allow for all necessary labour, plant and new material needed to leave the scheduled items as new and to the approval of the Engineer. Refer also to the general inclusion of costs in BH 06.01.01.

TECHNICAL SPECIFICATION

BJ PAINTWORK

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BJ 01 SCOPE
BJ 02 STANDARD SPECIFICATIONS
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BJ 01 SCOPE

This specification covers the painting/repainting and maintenance of new and existing building components and maintenance thereafter for various types of buildings and structures.

Paintwork shall mean the scope of work related to the preparation, painting and maintenance of new and existing building components. This specification does not include work related to galvanising of steelwork, which is specified elsewhere.

The complete scope of paintwork shall be as described in BJ 04: Detail of repair work.

BJ 02 STANDARD SPECIFICATIONS

BJ 02.01 GENERAL STANDARD SPECIFICATIONS

The latest edition, including all amendments up to date of tender of the following specifications, publications and codes of practice shall be read in conjunction with this specification and shall be deemed to form part thereof:

SANS 515 - Decorative paint with a non-aqueous solvent base for interior use
SANS 630 - Decorative high gloss enamel for interior and exterior
SANS 631 - Decorative oil gloss paint for interior and exterior use
SANS 633 - Emulsion paints for interior decorative purposes
SANS 634 - Emulsion paints for exterior use
SANS 678 - Primers for wood for interior and exterior use
SANS 681 - Undercoats for paints
SANS 683 - Roof paints (relevant sections)
SANS 723 - Wash primer (metal etch primer)
SANS 801 - Epoxy-tar paints
SANS 887 - Varnish for interior use
SANS 926 - Two-pack zinc-rich epoxy primer
SANS 1227 - Textured wall coatings, emulsion base, for interior and exterior use
SANS 1319 - Zinc phosphate primers for steel
SANS 10064 - Preparation of steel surfaces for coating
OW 371 - Specification of Materials and Methods to be used (Fourth edition, October 1993): Section 18

BJ 02.02 ADDITIONAL SPECIFICATIONS

Technical Specification BG: Metalwork
Paint manufacturers' specifications. These specifications shall take precedence over all others.

BJ 02.03 OCCUPATIONAL HEALTH AND SAFETY ACT

The Contractor shall be required to comply with the Occupational Health and Safety Act 85 of 1993, Construction Regulations 2014 and related regulations. Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

BJ 03 VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS

BJ 03.01 ADDITIONAL REQUIREMENTS FOR PAINTWORK

BJ 03.01.01 General

a) Quality control

i) Application of all paints must be supported by the relevant paint manufacturer's technical quality control systems with regard to preparation, application, film thickness, colour/pigmentation, mixing, etc.

ii) The Contractor must submit his programme to the Engineer well in advance, particularly where high-risk surface applications (sheet metal roofs, etc) are concerned, in order to keep the manufacturer's technical personnel informed. Paint application may not commence until the manufacturer has inspected the surface preparation and given written approval thereof to the Engineer.

b) Paint systems

i) All paint shall be delivered to the site in the unopened containers on which the manufacturer's name and trademark appear.

ii) All materials for paintwork shall comply with the requirements for standards from the country from which it originated and shall be approved by the Engineer.

iii) The Contractor shall submit copies of the paint manufacturer's specifications, recommendations and datasheets to the Engineer for approval.

iv) The coating system shall be from one manufacturer unless otherwise specified. The paint manufacturer's instructions shall be strictly adhered to.

v) Paints, etc, shall be suitable for application on the surfaces on which they are to be applied and various coats must be compatible with each other. Those paints used externally shall be of exterior quality or suitable for exterior use.

c) Guarantee

i) The Contractor must give a 3 year written guarantee for the quality and workmanship of the paint work (fair wear and tear excepted). The Contractor shall be liable for any peeling or flaking paint applied by the Contractor and shall execute all such work of repair, rectification and making good of painted surfaces as may be ordered in writing by the Engineer. The manufacturer must carry out inspections at regular intervals during the construction period. The Manufacturer must issue a certificate of acceptance and compliance on completion to the client.

BJ 03.01.02 General preparation of new and existing work

All walls and ceilings, etc, shall be thoroughly cleaned prior to commencement of painting and the premises kept clean and free from dust during painting operations. Protect all surfaces not to be painted against spotting and spilling. Clean down and make good as necessary. Locks, door handles and similar fittings or fixtures shall be removed (or masked) and refitted on completion of painting.

(a) Plaster

(i) All surfaces, sills, ceilings, etc, shall be thoroughly dry before painting operations are started. Porous surfaces must be sealed with the appropriate sealer, thinned if necessary, before applying the paint system.

(ii) Exterior surfaces: Any cracks shall be scraped out and filled with an approved filler or patching plaster and rubbed down flush; the whole surface shall be well brushed down to remove all loose dust and powdery material before applying the first coat of the specified paint system.

(iii) Interior surfaces: All cracks, blow holes, etc, shall be filled with suitable stopping and rubbed down flush. The whole surface shall be smoothed to an even finish and dusted down. Any grease marks, crayon marks, etc, shall be cleaned off with sugar soap and thoroughly rinsed with clean water. The surface shall be thoroughly dry before painting operations are started.

(iv) Ceilings: Ceilings shall be brushed down and free of all dust and powdery materials. Cover strips and cornices shall be stopped where necessary and rubbed down smooth. All nail heads shall be primed, stopped and rubbed down flush. The surface shall then be wiped or brushed free of all loose or powdery materials before applying the recommended paint system.

(v) Fibre cement: Fibre cement surfaces shall be cleaned down and primed with an approved sealer and undercoat.

(b) Metalwork

(i) Iron and steel: New iron and steel metalwork shall be cleaned with an approved degreaser and the most effective method available (shot or sand blasting, mechanical wire brushing, hand wire brushing) used to remove all rust and millscale. Any salt deposits resulting from a marine or industrial environment shall be removed by washing with water prior to priming.

(ii) Galvanised surfaces: New galvanised surfaces shall be well cleaned to remove all traces of oil and dirt with galvanised iron cleaner and rinsed with clean water.

(c) Woodwork

New woodwork shall be brushed down and the surface prepared as follows:
Knots shall be given a coat of an approved patented knotting. The surface shall be primed overall and all holes shall be filled. The surface shall then be rubbed down with glass paper until smooth and even. Woodwork that needs to be oiled, stained or varnished shall be free of all stains, pencil marks and other surface discolourations and blemishes and shall be stopped with tinted stopping and rubbed down.

(d) General

(i) Colours: All colours and tints are to be submitted to the Engineer for approval. Sample colours are to be prepared in all cases for the final coat and all work must be finished to colour approved by the Engineer. Where necessary, universal undercoat must be tinted to a shade lighter than the finishing coat.

(ii) Doors and windows: All doors and opening sections of windows must be left ajar after painting or varnishing until the paint is perfectly dry.

(iii) Protection and cleaning off: All necessary precautions are to be taken for the protection of all finished work and other trades during painting, and all ironmongery shall be removed where possible prior to the commencement of painting and re-fixed after completion. All paint spots, stains, etc, are to be cleaned off floors, walls, glass, etc, after completion.

BJ 03.01.03 Paint specifications for various components

(a) Fibre cement (ceilings)

(i) New work

(1) Interior

Ceilings to wet areas (ablutions, kitchens and laundries):

- Polyurethane alkyd enamel:
  Prepare and apply one coat synthetic copolymer primer. Stop with interior crack filler, seal crack filler with above primer. Apply two coats of polyurethane alkyd enamel interior quality paint.
- Universal fungicidal additive:
  To be added to above in proportions specified by the manufacturer. This additive will only be required in specific cases.

(2) Exterior

Preparation: Clean down to remove all dirt and grease, etc, fill nail-heads with exterior crack filler and sand down to a smooth and even surface.

Finishing coat (emulsion): Apply two coats of super acrylic copolymer PVA emulsion or polyurethane alkyd enamel.

(ii) Renovation (existing) work

(1) Interior

Ceilings previously painted, in good condition:

Preparation: Clean down to remove all dirt and grease, etc, fill nail-heads, cracks and defects with interior crack filler and sand down to a smooth and even surface.

Finishing coat (emulsion): Apply two coats of super acrylic copolymer PVA emulsion or polyurethane alkyd enamel.

Ceilings previously painted, in poor condition (to be finished in an emulsion system):

Preparation: Remove all loose and flaking paint, clean down to remove all dirt, grease, etc, prime nail-heads with zinc phosphate primer for steel. Apply one coat of primer to existing ceiling boards diluted with 20 % turpentine. Fill nail-heads, cracks and defects with interior crack filler and sand down to a smooth and even surface. Seal all repaired areas with above-mentioned primer.

Finishing coat: Apply two coats of super acrylic copolymer PVA.

Ceilings to wet areas:

Preparation as above, but to be followed by one coat synthetic copolymer primer and two final coats polyurethane alkyd enamel interior quality paint (with fungicidal additive, only if specified).

In cases where fungicidal attack is prevalent the prepared surface must be washed down with antiseptic solution, followed by sodium hyperchlorite and allowed to react for 15 minutes before washing down with water. Once dry, primer and finishing coats may be applied.

(2) Exterior

Not applicable.

(b) Woodwork truss/rafters (overhangs)

(i) New work

(1) Interior

Not applicable.

(2) Exterior

- Egg-shell/High-gloss enamel:
  Prepare and touch up knots with spirit soluble resin type knotting. Apply one coat of primer for wood. Stop with wood filler where necessary. Apply one coat of universal undercoat. Apply two coats of enamel.

- Creosote coating:
  Prepare surface to be clean, dry and sound apply on coat of creosote wood treatment coating.

(ii) Renovation (existing) work

(1) Interior

Not applicable.

(2) Exterior

Woodwork truss/rafters (overhangs) previously painted, in good condition (to be painted in egg-shell/high-gloss enamel):

Preparation: Clean down and sand to a smooth finish. Spot prime where necessary with primer for wood. Allow 24 hours drying. Stop with wood filler.

Undercoat: Apply one coat of universal undercoat. Allow 24 hours drying.

Finishing coat: Apply two coats of enamel paint.

Woodwork truss/rafters (overhangs) previously painted, in poor condition (to be finished in egg-shell/high-gloss enamel):

Preparation: Remove existing paint and sand down thoroughly. Touch up knots and resinous areas with knotting.

Primer: Apply one coat of universal undercoat. Allow 24 hours drying. Stop with wood filler and sand to a smooth finish.

Undercoat: Apply one coat of universal undercoat. Allow 24 hours drying.

Finishing coat: Apply two coats of enamel paint.

Creosote coating:

Preparation: Prepare surface. Apply two coats creosote wood treatment coating.

(c) Metalwork - steelwork and miscellaneous metal work (including general pipework)

(i) New work

(1) Interior

Unpainted:

Prepare and apply one coat zinc phosphate primer for steel. Apply one coat of universal undercoat. Apply two coats of high gloss enamel paint.

Shop-primed:

Touch up damaged primer with zinc phosphate primer for steel. Apply one coat of universal undercoat. Apply two coats of high-gloss enamel paint.

Cast-iron waste pipes:

Prepare and remove as much bitumen as possible. Apply one coat of aluminium paint. Apply one coat of universal undercoat. Apply two coats of high-gloss enamel paint.

(2) Exterior

Unpainted:

Prepare and apply one coat zinc phosphate primer for steel. Apply one coat of universal undercoat. Apply two coats of high-gloss enamel or oleoresinous aluminium paint (where applicable).

Shop-primed:

Touch up damaged primer with zinc phosphate primer for steel. Apply one coat of universal undercoat. Apply two coats of high-gloss enamel or oleoresinous aluminium paint (where applicable).

Cast-iron waste pipes:

Prepare and remove as much bitumen as possible. Apply one coat of universal undercoat. Apply two coats of high gloss enamel or oleoresinous aluminium paint (where applicable).

(ii) Renovation (existing) work

(1) Interior

Previously painted metalwork, in good condition (steel windows, door frames, miscellaneous steelwork, etc):

Preparation: Wash down with sugar soap and rise with clean water. Sand lightly and apply one coat universal undercoat.

Finishing: Apply two coats high-gloss enamel.

Previously painted metalwork, in poor condition:

Preparation: Remove all existing paint by means of scraping or wire brushing and sanding. Tightly adhering paint that cannot be removed may remain and be overcoated. Remove all signs of rust back to bright metal by sanding with emery cloth. Wash down with an approved degreaser, rinse with clean water to remove all traces thereof and allow to dry. Treat rusted areas with a water-based rust converter.

Primer: Apply one coat of zinc phosphate primer for steel. Allow overnight drying.

Undercoat: Apply one coat of universal undercoat. Allow overnight drying.

Finishing coat: Apply two coats high-gloss enamel. Allow overnight drying between coats.

Previously painted metalwork, to remove all previous paint to original surface:

Preparation: Remove all existing paint by means of scraping or wire Brushing, grinding and sanding Remove all signs of rust back to bright metal by sanding with emery cloth. Wash down with an approved degreaser, rinse with clean water to remove all traces thereof and allow to dry. Treat rusted areas with a water-based rust converter.

Primer: Apply one coat of zinc phosphate primer for steel. Allow overnight drying.

Undercoat: Apply one coat of universal undercoat. Allow overnight drying.

Finishing coat: Apply two coats high-gloss enamel. Allow overnight drying between coats.

(2) Exterior

Previously painted metalwork, in good condition:

Preparation: Wash down with sugar soap, followed by light sand-papering. Rinse with clean water.

Undercoat: Apply one coat of universal undercoat. Allow 24 hours for drying.

Finishing coat: Apply two coats of high-gloss enamel or oleoresinous aluminium paint (where applicable).

Previously painted metalwork, in poor condition:

Preparation: Remove all existing paint by means of scraping or wire brushing and sanding. Tightly adhering paint that cannot be removed may remain and be overcoated. Remove all signs of rust back to bright metal by sanding with emery cloth. Wash down with an approved degreaser, rinse with clean water to remove all traces thereof and allow to dry. Treat rusted areas with a water-based rust converter.

Primer: Apply one coat of zinc phosphate primer for steel. Allow for 24 hours drying.

Undercoat: Apply one coat of universal undercoat. Allow for 24 hours drying.

Finishing coat: Apply two coats of high-gloss enamel or oleoresinous aluminium paint (where applicable).

Previously painted metalwork, to remove all previous paint to original surface:

Preparation: Remove all existing paint by means of scraping or wire Brushing, grinding and sanding Remove all signs of rust back to bright metal by sanding with emery cloth. Wash down with an approved degreaser, rinse with clean water to remove all traces thereof and allow to dry. Treat rusted areas with a water-based rust converter.

Primer: Apply one coat of zinc phosphate primer for steel. Allow overnight drying.

Undercoat: Apply one coat of universal undercoat. Allow overnight drying.

Finishing coat: Apply two coats high-gloss enamel. Allow overnight drying between coats.

(3) Aggressive environments

Not applicable.

(d) Gypsum board (ceilings, etc)

(i) New work

(1) Interior (dry areas)

- Super acrylic PVA:
  Prepare and apply one coat synthetic copolymer primer for gypsum board diluted with 20 % turpentine. Stop with interior crack filler, seal crack filler with above-mentioned primer. Apply two coats of super acrylic copolymer PVA paint.

(2) Exterior (dry areas)

- Super acrylic PVA:
  Prepare and supply one coat of synthetic copolymer primer for gypsum board diluted with 20 % turpentine. Stop with interior crack filler, seal crack filler with above-mentioned primer. Apply two coats of super acrylic copolymer PVA paint.

(ii) Renovation (existing) work

(1) Interior

Previously painted gypsum board with PVA in good condition:

Preparation: Wash down with sugar soap to remove all dirt, grease, etc, and rinse off with clean water. When dry, make good all cracks and defects with interior crack filler and sand to a smooth and even surface.

Finishing coat: Apply two coats super acrylic copolymer PVA.

Previously painted gypsum board, in poor condition:

Preparation: Clean down. Remove all paint by sanding and scraping.

Primer: Allow overnight drying. Make good cracks and holes with crack filler. Seal crack filler with above primer and allow to dry.

Finishing coat (emulsion): Apply two coats of super acrylic copolymer PVA.

(2) Exterior

Not applicable.

(e) Cement plaster (walls) and concrete surfaces

(i) New work

(1) Interior

- Polyurethane alkyd enamel (in wet areas, kitchens, etc):
  Prepare and apply one coat bonding liquid, followed by one coat of synthetic copolymer primer for new plaster. Apply one coat of polyurethane alkyd enamel paint.

- Acrylic emulsion:
  Same as above, but apply acrylic emulsion with smooth velvet sheen interior quality paint.

- Gloss enamel:
  Same as for polyurethane alkyd enamel, but apply two coats high-gloss enamel.

- Super acrylic PVA:
  Prepare and apply one coat of synthetic copolymer primer. Apply two coats of super acrylic copolymer PVA.

- Semi-gloss pure acrylic finish:
  Prepare and apply one coat of synthetic copolymer primer. Apply one coat of pure acrylic paint.

(2) Exterior

- Pure acrylic:
  Prepare and apply one coat of alkali resistant synthetic resins bonding liquid. Stop with exterior crack filler. Apply one coat of copolymer primer. Apply one final coat of pure acrylic paint.

- Pure acrylic with Teflon:
  Preparation, priming and application as above.

- Super acrylic PVA:
  Prepare and apply one coat of synthetic copolymer primer. Apply two coats of super acrylic copolymer PVA.

- Acrylic emulsion (external textured):
  Preparation as above, followed by two coats textured exterior acrylic emulsion, allowing one hour drying time between coats.

(ii) Renovation (existing) work

(1) Interior

Previously distempered:

Preparation: Remove all distemper with a peeling agent. Rinse with clean water. Allow 48 hours to dry. Fill cracks and defects with interior crack filler. Sand down to a smooth and even surface.

Primer: Apply one coat of bonding liquid, allow a minimum of 24 hours and maximum of 72 hours for drying. Final primers as specified in BJ 03.01.03(e)(i).

Finishing coat: Apply similar paints to suit as specified in BJ 03.01.03(e)(i).

(2) Exterior

Previously painted cement plaster (walls) and surfaces, in good condition:

Preparation: Wash down thoroughly with sugar soap. Rinse with clean water. Fill with suitable exterior crack filler. Sand smooth.
Prime with one coat bonding liquid

Finishing coat: Apply similar paints to suit as specified in BJ 03.01.03(e)(i).

Previously painted cement plaster (walls) and surfaces, in poor condition (ie peeling, crazing, etc, not previously limewashed):

Preparation: Remove all paint and fill with suitable exterior crack filler.

Priming coat: Prime with one coat bonding liquid, allow to dry for a minimum of 24 hours and a maximum of 72 hours.

Finishing coat: Apply similar paints to suit as specified in BJ 03.01.03(e)(i).

(f) Fibre cement board (fascias and ceilings)

(i) New work

(1) Interior

New and wet asbestos sheets shall be allowed to dry out before painting is commenced.

Ceiling boards must be well primed on both sides with an approved sealer/undercoat before fixing.

- Super acrylic PVA:
  Prepare and apply one coat of sealer/undercoat. Prime nail heads with metal primer. Stop with filler. Apply two coats of super acrylic copolymer PVA.

(2) Exterior

New and wet asbestos sheets shall be allowed to dry out before painting is commenced.

Fascia boards and barge boards shall be well primed on both sides and edges painted with sealer/undercoat before fixing.

All sides of fascia boards must receive final coatings.

- Super acrylic PVA:
  Prepare and apply one coat sealer/undercoat. Prime nail heads with zinc phosphate metal primer. Stop with filler. Apply two coats of super acrylic copolymer PVA.

(ii) Renovation (existing) work

(1) Interior

Previously painted fibre cement board with emulsion paint, in good condition:

Preparation: Clean down thoroughly to remove any signs of dirt or grease. Fill all screw heads with a flexible resistant filler after screw heads have been primed.

Finishing: Apply two coats of super acrylic copolymer PVA paint.

Previously painted fibre cement board in poor condition:

Preparation: Remove previous paint coatings with super paint stripper. Thoroughly wash down with sugar soap and rinse with clean water. Prime nail and screw heads with zinc phosphate metal primer. Allow to dry.

Primer: Apply one coat of synthetic copolymer primer to all surfaces including back and edges, allow to dry. Fill all screw heads with weather resistant filler, allow to dry, sandpaper smooth and touch up with primer.

Finishing: Apply two coats of super acrylic copolymer PVA paint.

(2) Exterior

Previously painted fibre cement board with emulsion paint in good condition:

Preparation: Clean down thoroughly to remove any signs of dirt or grease. Fill all screw heads with a flexible weather resistant filler after screw heads have been primed.

Finishing: Apply two coats of super acrylic copolymer PVA paint.

Previously painted fibre cement board, in poor condition:

Preparation: Remove previous paint coatings with super paint stripper. Thoroughly wash down with sugar soap and rinse with clean water. Prime nail and screw heads with zinc phosphate metal primer. Allow to dry.

Primer: Apply one coat of sealer/undercoat to all surfaces including back and edges, allow to dry. Fill all screw heads with weather resistant filler. Allow to dry and sandpaper smooth. Touch up with primer.

Finishing: Apply two coats of super acrylic copolymer PVA paint.

(g) Galvanised iron roof (also gutters and rainwater pipes)

(i) New work

(1) Interior

Not applicable.

(2) Exterior

Galvanised iron - roofs: Water-based pure acrylic emulsion paint:

Scrub down thoroughly with degreaser, followed by a cleaner for galvanised iron. Rinse off thoroughly and ensure that all traces of cleaner have been removed and that the surfaces are free of any grease and oil. Apply one coat of galvanised metal primer. Allow to dry for 5 hours. (Must be overcoated within 24 hours maximum.) Apply one coat of water-based pure acrylic emulsion paint with non-fading pigment.

Galvanised iron - roofs: Mat acrylic roof paint:

Scrub down thoroughly with degreaser, followed by a cleaner for galvanised iron. Rinse off thoroughly and ensure that all traces of cleaner have been removed and that the surface is free of any grease and oil. Apply two coats of mat acrylic roof paint.

Galvanised iron - gutters and rainwater pipes: Gloss enamel:

Scrub down thoroughly with degreaser, followed by a cleaner for galvanised iron. Rinse off thoroughly and ensure that all traces of cleaner have been removed and that the surface is free of any grease and oil. Apply one coat of primer for galvanised iron. Allow to dry for 5 hours. (Must be overcoated within 24 hours maximum.) Apply two coats of gloss enamel paint with non-fading pigment.

(ii) Renovation (existing) work

(1) Interior

Not applicable.

(2) Exterior

Previously painted galvanised iron, in good condition:

Preparation: Thoroughly scrub down with fibre scrubbing brushes and sugar soap and rinse with clean water.

Finishing coat: Apply one coat water-based pure acrylic emulsion paint with non-fading pigment.

Unpainted or previously painted galvanised iron, in poor condition (ie flaking, peeling and rusting):

Preparation: Remove all previous paint coatings with steel wire brushes, plumber's egg-shaped lead scrapers, and coarse floor sandpaper. Remove all traces of rust with emery cloth back to bright metal and apply approved rust converter. Thoroughly scrub down using galvanised iron cleaner and rinse with clean water.

Primer: Apply one coat of galvanised metal primer. Allow a minimum of 5 hours and a maximum of 72 hours for drying.

Finishing coat: Apply one coat of water-based pure acrylic emulsion paint with non-fading pigment.

(h) Timber (doors, cornices, window frames, counters, skirtings, etc)

(i) New work

(1) Interior

- Polyurethane alkyd enamel (wet areas, kitchens, etc):
  Prepare knots with spirit soluble resin type knotting. Prime with primer (sanding sealer) for wood. Fill imperfections where necessary with wood filler. Apply one coat of universal undercoat. Apply two coats of polyurethane alkyd enamel.

- High-gloss/egg-shell enamel:
  Prepare knots with spirit soluble resin type knotting. Prime with primer (sanding sealer) for wood. Fill imperfections where necessary with wood filler. Apply one coat of universal undercoat. Apply two coats of enamel.

- Gloss/suede varnish (interior quality solvent based):
  Prepare knots with spirit soluble resin type knotting. Fill imperfections with wood filler. Sand surfaces to a smooth finish in grain direction and dust off.
  Thin first coat down in a ratio of 3 parts varnish to 1 part mineral turpentine and apply. Allow to dry for 24 hours. Apply two full-strength final coats with 24 hours drying time between applications.

(2) Exterior

- High-gloss/egg-shell enamel:
  Prepare with spirit soluble resin type knotting. Apply one coat of primer for wood. Fill where necessary with wood filler. Apply one coat of universal undercoat. Apply two coats of high gloss enamel.

- Gloss/suede varnish (exterior quality ultraviolet resistant solvent based):
  Prepare knots with spirit soluble resin type knotting. Fill imperfections with wood filler. Sand surfaces to a smooth finish in grain direction and dust off.
  Thin first coat down in a ratio of 3 parts varnish to 1 part mineral turpentine and apply. Allow to dry for 24 hours. Apply two full-strength final coats with 24 hours drying time between applications.

(ii) Renovation (existing) work

(1) Interior

Previously painted woodwork, in good condition (to be finished in polyurethane alkyd enamel):

Preparation: Wash sown with sugar soap to remove all dirt, grease, etc, then rinse off with clean water. Sand down to a smooth and mat surface. Make good cracks and defects with wood filler and after 24 hours drying, sand down again.

Finishing coat: Apply two coats of polyurethane alkyd enamel. Allow 24 hours for drying between coats.

Previously varnished woodwork in good condition (to be finished with interior quality varnish):

Repair defects with wood filler. Sand surfaces to a mat finish and apply two final coats varnish with 24 hours drying time between applications.

Previously painted woodwork in poor condition (to be finished with high-gloss/egg-shell enamel):

Preparation: Remove all paint, varnish and stain with super paint stripper. Wash down thoroughly with sugar soap and rinse with clean water. When surface is completely dry, sand down and apply one coat of spirit soluble resin type knotting to all knots. Fill all cracks and defects with wood filler and after 24 hours of drying, sand down to a smooth and even surface. Apply one coat oleoresinous wood primer. Apply one coat universal undercoat.

Finishing coat: Apply two final coats enamel.

Previously stained and varnished or painted woodwork in poor condition (to be finished in polyurethane alkyd enamel):

Preparation: Remove all paint, varnish and stain with super paint stripper. Wash down thoroughly with sugar soap and rinse with clean water. When surface is completely dry, sand down and apply one coat of spirit soluble resin type knotting to all knots. Fill all cracks and defects with wood filler and after 24 hours of drying, sand down to a smooth and even surface. Apply one coat oleoresinous wood primer.

Finishing coat: Apply one coat polyurethane alkyd enamel.
Previously varnished woodwork in poor condition (to be finished with interior quality varnish):

Remove all varnish with paint stripper. Wash down to dry completely. Further preparation and applications as for BJ 03.01.03(h)(i): New work - interior.

(2) Exterior

Previously painted woodwork, in good condition (to be repainted with high-gloss/egg-shell enamel):

Preparation: Clean down and sand to a smooth finish. Spot prime where necessary with oleoresinous wood primer. Allow 24 hours for drying. Stop defects with a flexible weather resistant wood filler.

Undercoat: Apply one coat of universal undercoat. Allow 24 hours drying.

Finishing coat: Apply two coats of enamel.

Previously varnished woodwork in good condition (to be finished with exterior quality ultraviolet resistant solvent based varnish):

Preparation and application as for similar interior item above.

Previously stained and varnished or painted woodwork, in poor condition (to be finished in high-gloss/egg-shell enamel):

Preparation: Remove all paint, varnish and stain with super paint stripper. Wash down thoroughly with sugar soap and rinse with clean water. When surface is completely dry, sand down and apply one coat of spirit soluble resin type knotting to all knots. Fill all cracks and defects with wood filler and after 24 hours drying, sand down to a smooth and even surface. Apply one coat oleoresinous wood primer. Apply one coat universal undercoat.

Finishing coat: Apply two final coats of enamel.

Previously stained and varnished or painted woodwork, in poor condition (to be finished in polyurethane alkyd enamel):

As for similar interior item above.

Previously varnished woodwork in poor condition (to be finished with exterior quality ultraviolet resistant solvent based varnish):

Preparation and application as for similar interior item above.

(i) Concrete and cement surfaces - floor paint

(i) New work

Exterior and interior

Preparation: Remove laitance, residual cement spillage, etc, by means of carborundum grinding and vacuum clean to remove all dust. Remove oil, grease or any other surface contaminants with degreaser and wash off with clean water. Allow to dry. The floor must have less than 5 % moisture content before painting may be done.

Finishing coats: Apply two coats of an alkali resistant solvent based stoep (modified alkyd) paint. The first coat may be thinned with 25 % mineral turpentine. Sixteen hours drying time must be allowed between coats.

(ii) Renovation (existing) work

Exterior and interior

Previously painted concrete and cement surfaces, in good condition:

Preparation: Remove any loose and flaking paint by means of carborundum grinding, back to firm feathered edges. Remove any polish, grease, oil and other contaminants with degreaser, wash clean and allow to dry. Sand old paint to a mat finish and vacuum clean to remove all dust.

Finishing coats: Apply two coats as for new work above.

Previously painted concrete and cement surfaces, in poor condition:

Strip completely by suitable means and treat as for new work above.

(j) Cement plaster or facebrick walls and concrete surfaces where damp penetration is evident

(i) Renovation

Exterior and interior

Preparation: Remove all damaged paintwork, efflorescence, loose friable material, etc, back to bare and sound substrate. Repair all damaged surfaces with suitable approved materials to match original surface.

Surfaces may remain damp and in some cases will require additional wetting, depending on the particular coating used.

Damp sealing coats: Apply two coats approved synthetic polymer modified water barrier coating in strict accordance with the particular product manufacturer's specifications. Allow 24 hours between coats unless otherwise specified.

Finishing coats: Apply decorative finishing coats to suit, as in BJ 03.01.03(e).

BJ 04 DETAIL OF REPAIR WORK

The detail of the scope of work is described in the Schedule of Quantities.

BJ 05 MAINTENANCE

No maintenance will be required for paintwork under this contract.

BJ 06 MEASUREMENT AND PAYMENT

BJ 06.01 MEASUREMENT AND RATES

BJ 06.01.01 General inclusion of costs and specific specifications

Notes:

All material scheduled to be removed shall be deemed to be existing damaged material. All such redundant material shall become the property of the Contractor and must be removed from site immediately.

All new material shall be deemed to be in patchwork and shall be of approved equal quality, colours, profiles, thickness, etc and shall in all cases match the existing materials and shall be applied (internally or externally) to existing material or surfaces.

All removal and repair work shall be done carefully as to not damage any adjacent or other material or work. Any damage to other or adjacent materials or areas caused by the negligence of the Contractor shall be repaired by him free of charge.

All work scheduled to be removed or taken out shall be deemed to include the cleaning and preparation of the remaining sections, areas, or work to receive the new material or work specified.

Repair work shall also include all cutting, grinding, cutting into, welding, bending, strengthening, drilling, etc to repair or to improve the items or areas as new and to match the existing.

Work scheduled to be realigned and refixed shall be deemed to include all necessary new additional materials, brackets, connector plates, bolts, pip rivets, nails, screws, spacer blocks, clamps, timber, and labour, etc to leave the items as new and totally functional.

All new work are measured net and shall include all cutting, lapping, waste, bending, fixing, corners, mitres, fixing screws, pip rivets, nails, adhesive, grout, putty, etc, as well as cleaning and preparation of surfaces not already prepared as part of removed items, etc.

All paintwork shall include for surface preparation, cleaning, primer(s), undercoat(s) and final coat(s) as specified by the manufacturers and in the Technical Specifications. Scheduled items in the Schedule of Quantities are mainly brief descriptions of the final coat(s) to identify the paint system as specified in the Specifications.

Most steel surfaces such as gratings, screens, gates, doors, mesh, louvres, burglar proofing, windows, etc are measured both sides on the net flat overall area of the item. Paint to roof covering and side cladding, etc are measured wet on the flat overall area of the items and not along the girth of the sheeting. All final re-measurements for payment purposes will be done on the same principles.

Rates tendered for paintwork shall be deemed to include for all "line cutting" between different colours of paint specified by the Engineer in dados, skirtings, etc.

Rates tendered for paintwork on ceilings and cornices shall be deemed to include for paint on cover and jointing strips.

Rates tendered for paintwork on ceilings, wall panelling, divisions, etc shall be deemed to include for timber door frames, jointing and cover strips, skirtings, cornices, quadrant beads, etc if painted with the same specified paint material and in the same colour schemes.

Where specified to be painted in contrasting colours, varnished or with a different paint material the paintwork on the door frames, skirtings, cornices, beads, cover strips, etc will be measured and paid for separately per linear metre.

Specific specification for floor paint

Preparation:

The concrete floor must have less than 3% moisture before painting is attempted. Remove laitance, residual cement spillage, etc by Carborandum grinding. Vacuum clean to remove all dust. Remove oil, grease, or any other surface contaminants with degreaser. Allow to dry thoroughly before painting.

Paint system:

Apply one coat of an alkali resistant solvent based stoep (modified alkyd) paint. The first coat may be thinned with approximately 25% mineral turpentine to aid penetration.

Apply one finishing coat of an alkali resistant solvent based stoep (modified alkyd) paint.

Protection of existing furniture, carpets, finishings, cupboards, etc during paint procedures

Protection, sheets and screens:

All existing finishings, carpets, floors, furniture, etc shall be carefully handled, moved when instructed within the specific room, building or area to be painted, covered with sheets, screens or other approved methods to protect the items or finishings against damage or spilled paint spots or stains. Any damage caused to the mentioned existing items shall be rectified or replaced by the Contractor without additional payment.

The costs of sheets, covers, screens and all labour to address the above shall be deemed to be included in the tendered rates for the individual payment items or in the general preliminary cost items. No claims by the Contractor in this regard will be entertained.

BJ 06.02 SCHEDULED ITEMS

NEW UNPAINTED SURFACES:

BJ.01 Paint to new unpainted surfaces:

(a) Description of surface:

(i) Brief description of final paint type:

(a) Description of application area or item to be painted ..... Unit: m^2, m, number

(b) Etc, for other areas or items

The unit of measurement shall be the number, metre or square metre as applicable to each item.

The tendered rates shall include full compensation for manufacturing, providing and applying each item complete as per specifications, drawings, descriptions as scheduled or as the existing and shall include for all labour, material, preparation work, waste, plant, transport, delivery, access, scaffolding, fuel, miscellaneous items and material, etc to the Engineer's approval.

PREVIOUSLY PAINTED SURFACES:

BJ.02 **Paint to previously painted surfaces:**

(a) Description of surface:

(i) Brief description of final paint type:

(a) Description of application area or item to be painted ..... Unit: m^2, m, number

(b) Etc, for other areas or items

The unit of measurement shall be the number, metre or square metre as applicable to each item.

The tendered rates shall include full compensation for manufacturing, providing and applying each item complete as per specifications, drawings, descriptions as scheduled or as the existing and shall include for all labour, material, preparation work, waste, plant, transport, delivery, access, scaffolding, fuel, miscellaneous items and material, etc to the Engineer's approval.

PREVIOUSLY PAINTED SURFACES IN POOR CONDITION:

BJ.03 **Paint to previously painted surfaces in poor condition:**

(a) Description of surface:

(i) Brief description of final paint type:

(a) Description of application area or item to be painted ..... Unit: m^2, m, number

(b) Etc, for other areas or items

The unit of measurement shall be the number, metre or square metre as applicable to each item.

The tendered rates shall include full compensation for manufacturing, providing and applying each item complete as per specifications, drawings, descriptions as scheduled or as the existing and shall include for all labour, material, preparation work, waste, plant, transport, delivery, access, scaffolding, fuel, miscellaneous items and material, etc to the Engineer's approval.

PREVIOUSLY PAINTED SURFACES TO REMOVE ALL PREVIOUS PAINT TO ORIGINAL SURFACE:

BJ.04 **Paint to previously painted surfaces to remove all previous paint to original surface**

(a) Description of surface:

(i) Brief description of final paint type:

(a) Description of application area or item to be painted ..... Unit: m^2, m, number

(c) Etc, for other areas or items

The unit of measurement shall be the number, metre or square metre as applicable to each item.

The tendered rates shall include full compensation for manufacturing, providing and applying each item complete as per specifications, drawings, descriptions as scheduled or as the existing and shall include for all labour, material, preparation work, waste, plant, transport, delivery, access, scaffolding, fuel, miscellaneous items and material, etc to the Engineer's approval.

TECHNICAL SPECIFICATION

BK STRUCTURAL CONCRETE

BK 01 SCOPE & STANDARD SPECIFICATIONS
BK 02 PROJECT SPECIFICATION
BK 03 MOVEMENT JOINTS
BK 04 REQUIREMENTS FOR REPAIR OF STRUCTURAL CONCRETE
BK 05 EXPANSION JOINT REMEDIAL PROCEDURE
BK 06 CONCRETE CRACKS
BK 07 TESTING STRUCTURES FOR LIQUID RETENTION
BK 08 SEALING MANHOLE RINGS AND COVERS METHODOLOGY
BK 09 DETAIL OF REPAIR WORK
BK 10 MEASUREMENT AND PAYMENT

BK 01 SCOPE

This specification covers the repair of existing structural concrete elements and the supply, delivery and implementation of the repair procedures for the various types of structures.

Structural concrete shall mean the scope of work to repair all structural concrete components such as walls, columns, stairs and suspended slabs and floors. Joint repairs also form part of this specification. This specification does not include work related to metalwork and paintwork that are specified elsewhere.

BK 01.01 STANDARD SPECIFICATIONS

The latest edition, including all amendments up to date of tender of the following specifications, publications and codes of practice shall be read in conjunction with this specification and shall be deemed to form part thereof:

OW 371	-	Specification of Materials and Methods to be used (Fourth Edition, October 1993)
SABS 1200 G	-	Concrete (structural)
SABS 1200 GA	-	Concrete (small works)
SABS 1200 GB	-	Concrete (ordinary buildings)
SABS 1200 GE	-	Precast concrete (structural)
SABS 1200 GF	-	Prestressed concrete
SABS 0100	-	Structural use of concrete
SABS 110	-	Sealing compounds for the building industry, two-component, polysulphide base
SABS 1077	-	Sealing compound for the building and construction industry, two-component, polyurethane-base
SABS 1254	-	Sealing compounds for the building industry, oleo-resinous base, for interior and exterior use
SABS 1305	-	Sealing compounds for the building industry, one-component, siliconed-rubber-base

BK 01.01.01 Occupational Health and Safety

The Contractor shall be required to comply with the Occupational Health and Safety Act 85 of 1993, Construction Regulations 2014 and related regulations. Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

BK 02 PROJECT SPECIFICATION

This Project Specification takes precedence over the Standard Specification, except in the case where an aspect is not covered by the Project Specification, in which case the Standard Specification will apply.

BK 02.01 CONCRETE MATERIALS

SANS standards: All concrete materials shall comply with the relevant SANS standards.

BK 02.01.01 Concrete mix designs

All mix designs for 20MPa and higher grades of concrete shall be tabled and approved by the Engineer in writing, before these mix designs may be used. Each mix design shall clearly state the type, origin and quantity per cubic metre of concrete for each constituent material. The mix design and constituent materials shall be such so as to produce **low shrinkage, crack-free concrete**.

BK 02.01.02 Cement types

Only cements of type CEM I as per SANS 50197-1 may be used. In addition, only cements of strength class 42,5MPa and higher may be used. Cement shall not be stored for more than 4 weeks before it is used.

BK 02.01.03 Cement extenders

Cement extenders such as fly-ash and slag may not be used in conjunction with CEM IIA. Should the Contractor wish to use cement extenders with CEM I, then he shall obtain the Engineer's prior approval. The Engineer might approve cement extenders of up to 15% in the warmer months of the year, but excluding May, June, July and August.

BK 02.01.04 Minimum cement content

The minimum cement content of CEM I or CEM IIA cements are: 280 kg/m^3 for 25MPa, 300 kg/m^3 for exposed 25MPa, 310 kg/m^3 for 30MPa and 330 kg/m^3 for 35MPa concrete.

BK 02.01.05 Water

The maximum water / cement ratio is as follows: 0,67 for 25MPa, 0,60 for 30MPa and 0,53 for 35MPa concrete. Admixtures such as water-reducing agents or plasticizers may be used, but then only strictly according to the manufacturer's instructions.

BK 02.01.06 Aggregates

The coarse aggregate (stone) shall be 19mm natural stone unless otherwise specified. The total mass of coarse aggregate (stone) shall exceed the total mass of fine aggregate (sand) per cubic metre of concrete. Aggregates used in concrete for sewage treatment works, channels and tunnels shall be dolomitic aggregate. A non-dolomitic filler sand may be used.

BK 02.02 REINFORCING STEEL MATERIALS

SANS standards: All reinforcing steel shall comply with the relevant SANS standards.

BK 02.02.01 Steel types

Mild steel (R-steel) shall not be replaced by high tensile steel (Y-steel).

BK 02.02.02 Steel bar dimensions

Steel bars shall be cut and bent strictly to the dimensions and radii stipulated on the project's bending schedules.

BK 02.03 FORMWORK CONSTRUCTION

BK 02.03.01 Formwork design

a) All formwork shall be designed by a competent person or a competent company, and the requirements for continuous propping and / or multi-level propping shall be calculated to a theoretical model acceptable to the Engineer. Design loads will be supplied by the Engineer on request. The Contractor shall make provision for the continued support of slabs and beams while the formwork pans / panels are being removed. No back-propping is allowed.

b) Wall formwork ferrules: The lay-out and positioning of ferrules shall be approved by the Architect / Engineer. In the case of water-retaining structures ferrules shall be of a type which does not leave holes through the walls.

c) Formwork quality: All formwork shall be sturdy, leak-proof and lightly oiled.

d) Formwork finish: All formwork finishes shall be at least of class SMOOTH to Degree of Accuracy II, or class SPECIAL to Degree of Accuracy I when so specified on the concrete drawings. Top surfaces of wood- and steel-trowelled concrete floors are to be class SPECIAL.

e) Upward cambers: All beams, bands and slabs shall have the following upward cambers, unless otherwise indicated on the concrete drawings: Cantilever spans: span ÷ 200 and other spans: span ÷ 500.

f) Construction joints: Positions of construction joints in beams and slabs shall be discussed with, and approved by the Engineer, and shall be formed using planks or well-supported chicken wire.

g) Cast-in items: The Contractor shall ensure that all cast-in items, eg conduits, sleeves, pockets, etc, of all the various building disciplines are accurately placed and secured before concrete is cast.

BK 02.03.02 Removal of formwork

Formwork and props may only be removed after “n” 24h days:

Walls and columns:	2 (hot / normal)	3 (cold)
Slabs with props left underneath:	4	7
Beams with props left underneath:	7	12
Slab props:	10	17
Beam props:	14	21

BK 02.04 REINFORCING STEEL FIXING

a) Steel shall be fixed using the specific project’s fixing plans and bending schedules.

b) Steel must be inspected and approved in writing by the Engineer before concrete may be cast. The Contractor shall give the Engineer at least 2 day’s notice of inspections.

c) Steel must be properly fixed in position, and purpose-made plastic or concrete spacer blocks must be in position before inspections.

d) The concrete cover to reinforcing bars shall be as specified on the plans and schedules, but under no circumstances shall the cover be less than: 20mm for plastered and internal slabs and beams; 30mm for exposed concrete surfaces and concrete columns; 40mm in the case of water-retaining structures; 75mm for concrete cast against soil.

e) No welding of reinforcing steel bars is allowed.

BK 02.04 CONCRETE CONSTRUCTION

a) Concrete shall be discharged in the position needed and not moved sideways with vibrators.

b) Concrete shall be properly vibrated using an adequate number of mechanical vibrators.

c) Concrete may only be cast when the ambient temperature is between 5ºC and above 32ºC. No concrete may be cast during rain and hail, or shortly before a rain storm.

d) All concrete elements shall be cured with either, tight wrapping with plastic, or a 50mm layer of wet sand, whichever appropriate, for the following durations: 5 days when hot / normal and 7 days when cold.

e) Other curing methods must be approved.

BK 02.05 CONSTRUCTION TOLERANCES

a) All concrete shall at least be constructed to Degree of Accuracy II (SMOOTH finish), and Degree of Accuracy I (SPECIAL finish) when so specified on the concrete drawings, as well as in the case of precast concrete elements.

b) Each permissible deviation is binding in itself, no cumulative effect will be allowed.

c) Permissible deviation (PD) of dimensions. Some selected values are:

PD:	DoA II:	DoA I:
Cross-section dimensions	-5 / +15 mm	-5 / +5 mm
Flatness of a plane surface	5 mm	3 mm
Abrupt change in continuous surface	5 mm	2 mm
Linear dimension (not cross-sections)	-20 / +20 mm	-10 / +10 mm
Verticality (per metre height)	5 mm	2 mm
Wood- / steel-trowelled top surfaces	-3 / + 3 mm	-3 / +3 mm

BK 02.06 CONCRETE TESTING

a) A set of concrete test cubes shall be made for every 50m3 of concrete produced, and at least one set of each day's concrete produced. Cubes shall be made strictly according to the SABS prescribed method, and shall be cured and tested by an independent laboratory.

b) A set of test cubes comprises 6 cubes, 3 to be tested on 7 days, and 3 on 28 days.

c) When ready-mixed concrete is used, the Contractor must still make cubes on site. Process cube results from a ready-mix plant are not acceptable.

d) A set of 3 cubes tested at 28 days passes when the average strength is at least 2MPa higher than the specified strength, and when no single cube tests lower than 3MPa below the specified strength.

BK 02.07 CONCRETE SCREEDS

(a) General

Concrete screeds shall have a minimum thickness of at least 50 mm. The Engineer shall determine the areas of which the concrete screeds need to be replaced.

Only cements of type CEM I and CEM IIA as per SANS 50197-1 may be used. In addition, only cements of strength class 42,5MPa and higher may be used. Cement shall not be stored for more than 4 weeks before it is used.

Coarse aggregate maximum size:	10 mm
28-day cube strength:	30 MPa OR 35 MPa. (as specified)

The use of an approved plasticizer is recommended to reduce the water content of the mix to the absolute workable minimum.

The mix design must be submitted to the Engineer in advance for approval.

Refer to BK 02.06 for the testing requirements of concrete.

(b) Preparation

All laitance on the surface of the slabs must be removed, using mechanical equipment such as scabblers, so as to expose the coarse aggregate of the concrete.

Before commencement of the screed, remove all loose material and dust, and keep the slabs thoroughly wet for eight hours, before placement of the screed.

(c) Placement of the screed

Remove all surface water from the slab. Apply a grout to the slab surface, which consists of a 1:1 mix of cement and clean fine sand, with just enough water to provide the consistency of a slurry. Vigorously brush the grout into the scabbled surface of the slabs using brooms. Strike off all surplus grout, leaving a thin layer of grout.

Place the screed concrete in one layer, in a checker board pattern, while the grout layer is still visibly wet. Compact the concrete very well using small mechanical vibrators.

(d) Finishing

The surface finish shall be SPECIAL as per SABS 1200G attained by steel trowelling.

Power floating should not commence until such time as the concrete surface, has lost its sheen and barely shows footprints.

All laitance on the surface of the fresh concrete screed resulting from the compaction of concrete, must be struck off prior to mechanical trowelling. Over-trowelling, causing excessive cement-water paste to come to the surface, must be strictly avoided.

(e) Joints

The screed shall have construction joints and expansion joints, in all the exact same positions as the underlying concrete slab.

In addition the screed shall be divided into panels of no larger than 3 x 3m. The length to width ratio of these panels shall not exceed 1.5.

All joints shall be formed with side formwork. An expansion joint former specifically developed for the intended applications must be used as specified by the Engineer.

Joints must be sealed with an approved 1-part polyurethane joint sealer for the intended purpose according to the Engineer’s specification.

(f) Curing

Curing of the screed concrete shall commence directly after the finishing operation stops, and shall continue for 7 days. The method of curing shall be by means of well held down plastic sheeting and with the daily adding of water.

BK 03 MOVEMENT JOINTS

BK 03.01 Joint Former

Ensure all concrete surfaces are free from base grit and dust. Apply glue in vertical strips ± 100 mm wide and 25 mm from the top to avoid the tear-off strip from sticking to the concrete face.

Allow the glue to dry (according to manufacturer's instructions) and then stick the joint former onto the glued concrete face.

Cast the next section of concrete as required. Take care not to let the wet concrete get behind joint former as this will result in a wavy joint.

When the joint sealant is about to be applied, simply peel the tear-off strip out of the formed joint, leaving an even groove of uniform depth for filling with sealant.

BK 03.02 Joint Sealant

Joints < 10 mm are normally designed for crack control and therefore they are not movement / expansion joints. The joint width to depth ratio is important at the time of the application of the sealant (guide value of +10°C).

BK 03.03 Application Method /Tools

After suitable joint and substrate preparation, insert Backing Rod to required depth and apply primer if necessary. Insert cartridge into sealant gun and firmly extrude joint sealant into joint, making sure that it is full contact with the side of the joint. Fill the joint, avoiding air entrapment. The joint sealant must be tooled firmly against joint sides to ensure good adhesion.

Masking tape must be used where sharp exact joint lines or exceptionally neat lines are required. Remove the tape whilst the sealant is still soft. Sleek joint with smoothing liquid for a perfect sealant surface.

BK 04 REQUIREMENTS FOR REPAIR OF STRUCTURAL CONCRETE

BK 04.01 Concrete repair

All existing structural concrete to be inspected to determine the extent of damage and repair work required. All remedial concrete work to be classified into the following categories by the Engineer/Department's representative:

- Surface concrete repair

  Cosmetic repair of concrete surfaces where no reinforcing is exposed, where cover to reinforcement is not a problem (non-aggressive environment) and for non-structural repairs.

- Mild to moderate concrete repair

  When the reinforcing is exposed and the extent thereof is small compared to the size of the element under consideration.

- Severe concrete repair

Where the front of the reinforcing is exposed in large areas or reinforcing is exposed totally. Generally when the defective areas have adverse structural implications.

The above categories do not apply to off-shutter concrete, which will be treated on merit.

Any structural concrete elements that are damaged to such an extent that they cannot be classified under severe concrete repair, will be treated on merit. Detailed instructions will be issued during repair for the rehabilitation of such structural concrete elements.

BK 04.02 **Surface concrete repair procedure**

The following procedure, or similar approved by the Engineer/Department's representative to be used:

- Remove all loose and defective material and clean around affected area to expose aggregate.
- Saw-cut 10 mm vertically around edges of repair area and break out concrete within to avoid tapered feathering.
- Wet area well, approximately 30 minutes before commencement of repair.
- Apply an approved shrinkage compensated pre-mixed ready to use single-component polymer modified, cementitious repair mortar in strict accordance with the manufacturer's specifications.
- The repaired surface to be cured by covering with plastic sheeting and keeping wet for 48 hours or as otherwise specified.

BK 04.03 **Mild to moderate concrete repair procedure**

The following procedure, or similar approved by the Engineer/Department's representative to be used:

- Remove all loose and defective material and break out to a minimum depth of 10 mm.
- Saw-cut 10 mm vertically around edges of repair area and break out concrete within, to avoid tapered feathering.
- Ensure that concrete is free from laitance, oil, grease, etc, and is sound, firm and clean.
- Exposed reinforcing to be wire brushed clean and free of all rust and then coated with an approved single component epoxy zinc primer.
- The concrete to be thoroughly wetted and kept wet for a minimum of 12 hours before applying remedial product, loose standing water to be removed prior to application of repair mortar.
- Apply an approved shrinkage compensated pre-mixed ready to use single-component polymer modified, cementitious repair mortar in strict accordance with the manufacturer's specifications.
- The repaired surface to be cured by covering with plastic sheeting and keeping wet for 48 hours or as otherwise specified.

BK 04.04 **Severe concrete repair procedure**

The following procedure or similar approved by the Engineer/Department's representative to be used:

- Propping of structure may be necessary during repair period.

- Chop around defective area removing all loose and suspect material taking care not to damage the existing reinforcing.

- Exposed reinforcing to be wire brushed clean and free of all rust and then coated with an approved single component epoxy zinc primer.

- The damaged area to be chopped rectangular in shape to expose the sound aggregate, and feathered edges to be saw-cut vertically and broken out to a minimum depth of 10 mm.

- Ensure that the cavity is clean, dry and free of any debris.

- Apply an approved epoxy resin repair compound strictly in accordance with the manufacturer's specifications.

- Apply an approved shrinkage compensated pre-mixed ready to use single-component polymer modified, cementitious repair mortar in strict accordance with the manufacturer's specifications.

BK 05 **EXPANSION JOINT REMEDIAL PROCEDURE**

The following procedure to be used for remedial work to expansion joints.

- Remove all damaged sealant from expansion joint.

- Joint former/filler must be removed.

- Remove all loose materials mechanically to ensure a sound, clean and dry concrete surface.

- Where required, the sides of the concrete joint to be cut smooth and straight with an angle grinder or diamond saw.

- Where required, the edges of the expansion joints to be provided with a fillet. Engineer to determine on site.

- Install a non-bituminous, non-extruding resilient joint filler where existing joint former/filler was removed.

- Install a closed cell resilient foam cord or release film or bond breaking tape before applying sealant.

- A primer coat to be applied to all surfaces, brushed well into the faces of the joint.

- Install a single component fast curing polyurethane joint sealer strictly according to the manufacturers specifications.

- Install a High performance joint and crack sealing system consisting of elastomeric sealing strip, backing strip and thixotropic epoxy adhesive in horizontal floor joints with constant water pressure not exceeding 4m

- All materials to be submitted to the Engineer for approval prior to installation.

BK 06 **CONCRETE CRACKS**

All existing concrete to be inspected to determine the extent and damage due to cracking of concrete. The cause of cracking is to be established to determine the correct remedial action to be taken. The Engineer/Department's representative will determine the extent of repair work required, which will in most cases, require individual specifications to suit.

BK 06.01 **Concrete crack repair procedure**

(Generally used where cracking could adversely affect the structure)

The following procedure, or similar approved by the Engineer/Department's representative to be used:

- The surface over the entire length of the crack should be wire brushed to remove laitance or any other deleterious materials from the concrete.
- If the surface of the concrete is unsound, chase/grind a vee cut into the crack.
- All debris to be removed.
- Drill holes into the crack. The size, depth and centres etc. as specified for the crack injection product to be used. Blow out holes free of drill dust.
- Install injection nipples into the holes as specified. Allow for air release holes.
- Seal the face/s with an approved epoxy.
- Pump in approved epoxy liquid to suit crack size/width.
- The above repair system to be done strictly in accordance with the manufacturers specifications and requirements, and must be carried out by approved specialists or suitably trained persons.

BK 06.01 **Concrete crack repair procedure**
(Generally used for small cracks and where cracking could cause leaking thought the concrete)

The following procedure, or similar approved by the Engineer/Department's representative to be used:

- The surface over the entire length of the crack should be wire brushed to remove laitance or any other deleterious materials from the concrete.
- If the surface of the concrete is unsound, chase/grind a vee cut into the crack.
- All debris to be removed.
- Inject in an approved polyurethane 1-part joint sealant to suit crack size/width. The width of the crack must be 1.25 times the depth of the crack or in accordance with the manufacturer’s specification.
- The above repair system to be done strictly in accordance with the manufacturers specifications and requirements, and must be carried out by approved specialists or suitably trained persons.

BK 07 **TESTING STRUCTURES FOR LIQUID RETENTION**

The British Standard BS 8007:1987 Design of Concrete Structures for Retaining Aqueous Liquids have reference.

For a test of liquid retention, the structures should be cleaned and initially filled to the normal maximum level with the specified liquid (usually water) at a uniform rate of not greater than 2m in 24 hours.

When first filled, the liquid level should be maintained by the addition of further liquid for a stabilizing period while absorption and autogenous healing take place. The stabilizing period may be 7 days for a maximum design crack width of 0.1mm or 21 days for 0.2mm or greater.

After the stabilizing period, the level of the liquid surface should be recorded at 24 hour intervals for a test period of 7 days. During this 7 day test period the total permissible drop in level, after allowing for evaporation and rainfall, should not exceed 1/500th of the average water depth of the full tank, 10mm or another specified amount.

Notwithstanding the satisfactory completion of the test, any evidence of seepage of the liquid to the outside surfaces of the liquid retaining walls should be assessed against the requirements of the specification.

Any necessary remedial treatment of the concrete, cracks or joints should, where practicable, be carried out from the liquid face.

When remedial lining is applied to inhibit leakage at a crack, it should have adequate flexibility and have no reaction with the stored liquid.

BK 08 SEALING MANHOLE RINGS AND COVERS METHODOLOGY

The description of the method indicated below is intended for the construction of new pre-cast manhole ring sections in new construction work and the cost of sealing the manhole rings is included in the specified manholes and must be stipulated in the drawings. When indicated in the drawings as part of the installation requirements, the following method of sealing must be used.

For effective flexible, waterproof, joint sealing between most building components, with mastic type sealants, the following systems are recommended.

1. The joint ridge of the manhole rings must be clean, sound (firm), dry and free from any loose, weak or foreign materials.

2. Prime the joint ridges of the manhole rings, top and bottom with bitu.®prime and allow to dry for a minimum of 4 hours.

3. As each new manhole ring is placed, a 20 x 20mm strip of bitu.®joint putty must be placed on the bottom ring and the top ring firmly bedded into the bitu.®joint putty.

4. Manhole covers should equally be bedded into a strip of bitu.®joint putty, which will keep it sealed and waterproof but will allow removal of the cover when required.

5. The completed manhole should be coated with 3 coats of super laykold or Index Fidia P 4mm torched onto a primed surface using bitu.®prime on the exterior of the rings, before backfilling, to prevent the ingress of ground water.

6. Where the manholes ring section installation serves as a pump station (water retaining structure), the completed manhole should be coated with 3 coats of super laykold or Index Fidia P 4mm torched onto a primed surface using bitu.®prime on the interior and exterior of the rings, before backfilling, to prevent the ingress of ground water.

7. The manhole can be put into use immediately after completion.

BK 09 DETAIL OF REPAIR WORK

The Schedule of Quantities shows approximate quantities of work. Detailed instructions will be issued during construction.

BK 10 MEASUREMENT AND PAYMENT

BK 10.01 REPAIRS TO EXISTING STRUCTURES ……..Unit m²

The unit of measurement shall be the square meter area of existing concrete that needs to be repaired.

The tendered rate shall include full compensation for the applicable preparation work and application of the patching and repair mortar grout complete including all cost. The Contractor shall work in strict compliance with the descriptions provided in this Specification for the specified work.

The type of repair required will be specified in the Bill of Quantities.

BK 10.02 PROTECTIVE COATINGS ON EXISTING OR NEW CONCRETE SURFACES……Unit m²

The unit of measurement shall be the square meter area of existing or new concrete surface to be protected.

The tendered rate shall include full compensation for the applicable preperational work and application of the specified coating complete including all cost.

BK 10.03 PREPARE EXISTING CONCRETE SURFACES BEFORE CASTING NEW CONCRETE……..Unit m²

The unit of measurement shall be the square meter area of existing concrete that needs to be prepared in order to receive new concrete and will be measured for the nett width and length of the concrete that is prepared.

The tendered rate shall include full compensation for the applicable work required to prepare the concrete and application of the patching and repair mortar grout complete including all cost.

The same work shall apply as for severe concrete repair as described in BK 04 requirements for repair of structural concrete except no special mortars will be required and the new concrete will be placed on the old concrete forming a construction joint. Care should be taken to ensure that the concrete structure remains water tight after completion of the work.

BK 10.04 REPAIR AND SEAL EXPANSION/MOVEMENT JOINTS……..Unit m

The unit of measurement shall be the meter of existing expansion or movements joint that needs to be prepared in order to receive new joint sealing material and will be measured for the nett length of the joint that is repaired and sealed.

The tendered rate shall include full compensation for the applicable work required to prepare the concrete and application of the patching and all materials, equipment and labour required to complete the work.

The tendered rate shall ensure a that the joint is repaired and sealed to form a watertight surface that is sound, impervious and should be able to resist chemicals in severe raw sewage conditions.

Separate items will be specified in the Bill of Quantities for the type of joint that must be repaired and sealed.

BK 10.05 **CLEAN AND PREPARE REINFORCEMENT**……..Unit: m / sum

The unit of measurement shall be the metre or sum of existing reinforcement that needs to be cleaned and prepared in order to receive new concrete and will be measured for the nett distance of the specified size or type of reinforcement that is cleaned and prepared.

The tendered rate or sum shall include full compensation for the applicable work required to remove if require, clean, prepare and reinstallation if required, of the reinforcement and shall include for all materials, equipment and labour required to complete the work and shall include all support work required to clean and prepare the reinforcement.

Separate items will be specified in the Bill of Quantities for the type and size of reinforcement that must be cleaned and prepared as well as each type of structure where the work is required.

Removal and reinstallation will be specified if required. The reinforcing must be cleaned in such a manner that it does not reflect any flacking rust or so that it has no contamination of any means visible.

Where reinforcement requires alteration or bending in order to comply with the detail drawings, the same requirement as above to prepare and clean the reinforcing shall apply but the labour and/or machinery required to execute the work shall be included in the rate tendered and the size, type and structure will be specified in detail in the Bill of Quantities or relevant drawings.

BK 10.06 **ADDITIONAL TESTING OF LIQUID RETENTION OF STRUCTURES**……..Unit Sum

The unit of measurement shall be the sum tendered in order to test the liquid retention of existing structures.

The tendered rate shall include full compensation for the applicable work required to test the existing structures and all materials, equipment and labour required to complete the work and shall include all support work required. Also see BK 07 for the method of carrying out the test.

Separate items will be specified in the Bill of Quantities for the type of structure that must be tested as well as the size of the structure.

TECHNICAL SPECIFICATION

CE WATER DISTRIBUTION NETWORKS

CONTENTS

CE 01 SCOPE
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CE 05 TESTS AND INSPECTIONS ON COMPLETION
CE 06 QUALITY ASSURANCE SYSTEM
CE 07 MAINTENANCE TO INSTALLATION SYSTEM AND EQUIPEMNT
CE 08 MEASUREMENT AND PAYMENT

CE 01 SCOPE

This specification covers the materials, equipment, methods, testing and work required for the repair and maintenance of existing water distribution networks. Such distribution networks may comprise:

(a) Primary and secondary distribution pipelines
(b) Irrigation pipe networks and sprinklers
(c) Valves
(d) Bulk water meters
(e) Domestic water meters
(f) Chambers
(g) Pumping stations
(h) Borehole installations
(i) Reservoirs.

This specification shall form an integral part of the maintenance and repair contract document and shall be read in conjunction with portion 3: Additional Specifications included in this document.

This specification shall act as a guideline to the Particular Specification and, in the event of any discrepancies between the Technical Specification and the Particular Specification, the latter shall take precedence.

The Contractor shall at all times adhere to this specification, unless otherwise specified in the Particular Specification.

CE 02 STANDARD SPECIFICATIONS

CE 02.01 GENERAL STANDARD SPECIFICATIONS, REGULATIONS AND CODES

The latest edition, including all amendments up to date of tender, of the following specifications, publications and codes of practice shall be read in conjunction with this specification and shall be deemed to form part thereof:

SANS 1200 D - Earthworks
SANS 1200 DB - Earthworks (pipe trenches)
SANS 1200 G - Concrete (structural)
SANS 1200 L - Medium-pressure pipelines
SANS 1200 LB - Bedding (pipes)

CE 02.02 OCCUPATIONAL HEALTH AND SAFETY ACT

The Contractor shall be required to comply with the Occupational Health and Safety Act 85 of 1993, Construction Regulations 2014 and related regulations. Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

CE 02.03 MANUFACTURERS' SPECIFICATIONS, CODES OF PRACTICE AND INSTALLATION INSTRUCTIONS

All equipment and materials shall be installed, serviced and repaired strictly in accordance with the manufacturers' specifications, instructions and codes of practice.

CE 02.04 MUNICIPAL REGULATIONS, LAWS AND BY-LAWS

All municipal regulations, laws, by-laws and special requirements of the Local Authority shall be adhered to unless otherwise specified.

CE 03 OPERATING AND MAINTENANCE MANUALS

No operating and maintenance manuals will be developed for this section.

The contractor shall use the Maintenance Control Plan (see SA Maintenance) to schedule routine preventative maintenance activities.

CE 04 EXECUTION OF REPAIR WORK

CE 04.01 GENERAL

The Contractor shall investigate and inspect all areas of the installation to confirm the extent of the repair work required and shall report to the Engineer. The Engineer will thereafter demarcate any areas to be repaired and shall instruct the Contractor with regard to the repair work to be done.

At the start of the maintenance and servicing Contract all the systems, installations and equipment shall be repaired as specified in the Particular Specification. This repair work shall include but not be limited to the specified Particular Specification details.

All repair work shall be executed using approved materials and equipment suitable to the systems and/or installations they serve.

All materials and equipment shall comply fully with the requirements as specified for each installation.
The said repair work shall be executed in accordance with the relevant codes of practice, standards, regulations, municipal laws and by-laws, manufacturer’s specifications and codes of practice and all additional and particular specifications included in this document.

All new equipment, materials and systems shall be furnished with a written guarantee with a defects liability period of 12 months from date of completion of repair work. These guarantees shall be furnished in favour of the Department of Public Works. On completion of the required and specified repair work the systems, installations and equipment shall be commissioned and handed over if the satisfaction of the Engineer has been obtained.

Repair work items for the water distribution systems shall be categorised under the following headings:

(a) Repair of existing pipelines
(b) Cleaning of existing pipelines
(c) Repair of fittings
(d) Repair of existing structures.

CE 04.02 REPAIR OF EXISTING PIPELINES

This section covers the requirements for the repair of the water distribution pipelines for defects such as pipe breaks and leakage for distribution pipelines.

CE 04.02.01 General

Repair work to the water distribution system is detailed in the Particular Specification and may include but not be limited to the following:

(a) Replacement of damaged, broken, leaking, corroded surface and underground pipework and fittings;

(b) Replacement of damaged, broken and missing manhole covers and frames;

(c) Repair work to damaged manholes;

(d) Initial unblocking and clearing of all water distribution pipes and manholes;

(e) Repair and upgrading of the water distribution system where necessary;

(f) Introduction of additional connections to the water distribution system;

(g) Removal of unauthorised connections;

(h) Reinstatement and making good of walls, concrete, road surfaces, etc, to an approved acceptable level where any repair, upgrade and/or service work has been executed;

(i) Video surveying of all underground drainage pipework to establish root ingress, damaged pipework, fat build-up, blockages, incorrect falls, sagging and as-built information. This survey shall be utilised to establish the extent of repair and upgrade work to be executed;

(j) Test pipe system for leakage;

(k) Repair, replace and service valves, which shall include new gaskets, gland packings, seals, bolt and nuts, etc;

(l) Where valves do not close properly, all these valves shall be refurbished, de-scaled and if necessary replaced;

(m) Repair, clean and service all strainers, including the replacement of strainer elements where corroded and installation of new gaskets;

(n) Repair, service, test and readjust pressure-reducing valves. Pressure gauges are to be recalibrated and checked. Up and downstream pressures are to be logged. Downstream pressure has to be adjusted to an acceptable level, taking into account the allowable working pressure of the system and its components;

(o) Repair, service and check the proper functioning of all non-return valves;

(p) Repair, service, readjust and calibrate all safety and expansion relief valves;

(q) Repair, service and clean out all air release valves and vacuum breakers;

(r) Repair, service and log readings of water meters including cleaning of integral strainers;

(s) Water storage tanks are to be emptied, cleaned out, repaired, sealed and put back into operation. Ball float and/or filling valves to these tanks are to be serviced and repaired where required;

(t) Water pipes are to be sampled for corrosion and scaling. The Engineer will evaluate the actions to be followed if the outcome of this sampling requires attention;

(u) Water supply has to be sampled and chemically analysed for the suitability to the systems and materials it serves;

(v) Pressure test and sterilise repaired new installation and equipment;

(w) Reinstatement and making good of walls, tiling, floors, concrete, finishes, holes, chases, surfaces, etc, to an acceptable level where repair, upgrade and/or service work have been executed.

CE 04.02.02 Construction

The Engineer will indicate the pipeline sections in need of repair and shall instruct the Contractor with regard to the repair work to be done.

(a) Excavation

The width of the excavation shall be sufficient to allow the proper laying, bedding and backfilling of the pipelines. The width of the excavation for each type and size of pipeline shall be as set out in SANS 1200 DB.

The depth of the excavation for each type and size of pipeline shall depend on site conditions and the amount by which the excavation is to exceed the proposed level of the invert of the pipeline and shall be sufficient to allow the type and thickness of bedding material instructed by the Engineer.

Where excavation is to be carried out through asphalt premix or concrete, the asphalt/concrete shall be cut neatly and vertically with approved sawing equipment before the asphalt/concrete is removed.

Cutting, breaking out and replacing of concrete pavements will be paid under Subclause CA.02.

Excavations shall extend such that, where possible cut in may be reduced by lifting adjacent pipes.

(b) Classification of excavation

All excavations shall be classified as follows for payment purposes:
(i) Hard material

Material which cannot be excavated except by drilling and blasting or with the use of pneumatic tools or mechanical breakers and boulders exceeding 0,10 m^3 shall be classified as hard material.

Where more than 40 % of any material (by volume) consists of boulders each exceeding 0,10 m^3 in size, the material shall be classified as hard material.

(ii) Soft material

All material not classified as hard material shall be classified as soft material.

Notwithstanding the above classification, all material excavated from previously constructed fills, subgrades and subbases shall be classified as soft material.

(c) Disposal of excavated material

Where excavated material does not comply with the requirements for backfilling material as specified or is surplus to backfilling requirements, such excavated material shall be removed from the site.

Material suitable for use in the works, however, shall be used as prescribed.

(d) Removal of damaged pipelines

Where indicated by the Engineer damaged sections of pipelines shall be completely removed and replaced.

(e) Pipe couplings

Repair sections will be joined, utilising existing pipe sockets and collars where possible.

Repair couplings shall be used with the approval of the Engineer.

(f) Laying of uPVC pipelines

New sections of uPVC pipelines shall be laid on a granular bed suitable for flexible pipelines as directed by the Engineer. The inside of the pipes shall be smooth and without any displacement and all pipes shall be laid true to line and level with a minimum slope of 2 % or as directed by the Engineer.

Refer to SANS 1200 LB: Bedding (pipes), for the specification on bedding.

(g) Laying of asbestos cement, concrete or galvanised mild steel pipelines

New sections of the pipelines shall be laid on class A or B bedding as directed by the Engineer. The inside of the pipes shall be smooth and without any displacement and all pipes shall be laid true to line and level with a minimum slope of 2 % or as directed by the Engineer.

Refer to SANS 1200 LB: Bedding (pipes), for the specification on bedding.

(h) Rock foundation

Where rock, shale or hard material is encountered on the bottom of excavations a bed of fine material as required for class B bedding shall be placed before laying the pipe.

(i) Concrete encasement

Where instructed by the Engineer pipes shall be encased in concrete. All such encasing shall be done in accordance with the Engineer's instructions and sufficient allowance shall be made for movement joints.

(j) Extension of existing pipelines

Where existing pipelines require extension or where damaged sections are replaced the new sections shall be placed at the same grade and, where they join the existing service, at the same level as the existing pipeline.

Existing chambers or other structures which may obstruct any new work shall be demolished and removed. The demolition and reconstruction of new structures shall be paid for under the relevant sections in the specification.

(k) Construction in existing roads

Road crossings shall either be constructed utilising sufficient provision of bypass roads or utilising the half width of the road. At all times a through route shall be maintained for all traffic.

(l) Repairing of leaks

Where leaks occur at pipe sockets or collars the affected section shall be cut from the pipeline and repaired using repair couplings.

Where obvious leaks occur due to displaced sealing rubbers, the rubbers shall be replaced if the replacement can be done economically by lifting adjacent pipes.

(m) Replacement of pipes damaged by exposure to extensive ultraviolet light

Pipes damaged as a result of excessive exposure to sunlight shall be replaced where indicated by the Engineer.

CE 04.02.03 Quality standard

Pipelines shall be laid at even gradients within the points of correction, to the satisfaction of the Engineer and the applicable specifications.

CE 04.02.04 Materials

Materials and equipment to be used for repair items shall be suitable and/or adaptable to the existing installation and shall comply with the following:

(a) Supercast cast-iron pipes and fittings

Supercast cast iron pipes can be used for underground and above ground installations. Plain ended cast iron pipes and fittings shall be used, manufactured from 150, Grade A, grey iron in accordance with SANS 1034. Fittings and pipes shall be free of pinholes, blowholes, blemishes, flash and foundry sand and have a smooth bore. All pipes and fittings shall be sand blasted and coated on the inside and outside by submersion in a corrosion inhibiting oxide primer or bitumen paint.

The pipes and fittings shall be joined by means of stainless steel neoprene couplings as supplied by the manufacturer's of the pipe system. The coupling shall be installed according to the manufacturer's specification and is to be tightened with a torque wrench to a torque of 6,8 Nm.

(b) uPVC pipe and fittings under ground

uPVC pipes and fittings can be used for above ground installations.

For pipe sizes larger than 160 mm diameter, uPVC class 6 pressure pipe to SANS 966 shall be used with prefabricated uPVC bends and junctions. Prefabrication shall be done by means of hot-air welding of fittings to be covered with three layers of fibreglass reinforced lining over welded sections. The resin to be used shall be as specified by the manufacturer for usage with PVC. Bends shall be manufactured out of 3 to 4 sections per bend. Pipe joints shall be done by means of couplings fixed with solvent cement for PVC piping. This joint shall be reinforced with a fibreglass lining of three layers.

Piping is to be supported and bracketed with properly sized and designed brackets consisting of two half sections clamped over the pipe and hung with two hanger rods.

Pipes are to be pressure tested in sections as specified in this specification.

(c) Prefabricated galvanised steel piping and fittings above ground

The pipe to be used shall be plain-ended medium gauge uncoated pipe to SANS 62, galvanised to SANS 763 and shall be approved by the Galvanising Association of South Africa. All fittings are to be manufactured out of the same material, welded with flanged ends or rolled ends to fit clambon fittings. Fittings are only to be galvanised after manufacturing. All joints are to be either flanged or equipped with clambon couplings. All fittings and junction to be 45° sections.

The pipe system must be properly secured and bracketed at regular intervals with correctly sized and designed galvanised brackets.

Pipes are to be pressure tested in sections as specified in this specification.

(d) Geberit HDPe pipe and fittings

Geberit HDPe pipes and fittings can be used for underground and above ground installations where specified. Pipes shall be plain ended and only Geberit HDPe bends and fittings shall be used. Jointing of pipes and fittings shall be done by butt welding, electro-sleeve couplings and/or flanged joints. Pipes and fittings shall only be installed by Geberit approved installers and the Contractor shall furnish a certificate to this effect. Pipes and fittings shall be installed strictly according to the Geberit application technique.

Pipes are to be pressure tested in sections as specified in this specification

(e) Galvanised steel pipe installations

(i) All galvanised steel pipes shall be medium gauge mild steel screwed and socketed pipes to SANS 62 and shall be normalised and marked as such by the manufacturer. Pipes shall be hot-dipped galvanised to SANS 763 and shall be approved by the Galvanising Association of South Africa.

(ii) All fittings shall be malleable cast-iron fittings to SANS 509 and galvanised to SANS 763 and shall be approved by the Galvanising Association of South Africa.

(iii) All 80 diameter and larger pipes shall be joined with Class 16 flanged couplings to SANS 1123/1600. The bolts, nuts and spring washers to be used on these joints shall be cadmium plated.

(iv) In pipe ducts and elsewhere pipes shall be fixed onto walls, soffits, etc, with approved type of supports, holderbats, clamps, etc. Brackets shall be designed to structurally support and fix the pipe system and shall have enough clearance from walls, soffits, etc, to insulate hot-water pipes and maintain equipment.

(v) Pipes shall be supported according to the manufacturer's specifications with approved brackets at the following maximum intervals:

NORMAL SIZE (mm)	HORIZONTAL (mm)	VERTICAL (mm)
15 dia to 20 dia	1 200	1 830
32 dia to 40 dia	1 830	2 450
50 dia to 150 dia	2 450	3 050

(vi) Pipes shall be installed in such a manner as to prevent airlocks. A minimum rise of 1:250 shall be maintained to high points, which shall be fitted with suitable air release valves.

(vii) All pipes shall be marked according to SANS 10140 or as specified by the Engineer. All surface pipes shall be painted.

(viii) Pipes shall be installed flush unless otherwise instructed by the Engineer.

(ix) Provision shall be made for thermal contraction and expansion.

(x) The type of pipe joint compound shall be approved by the Engineer and used sparingly with good quality hemp. For pipes larger than 80 mm diameter a jointing compound such as Epidermix 32 shall be used.

(xi) Any pipes buried shall have at least 900 mm cover and be coated and wrapped to SANS 11 17 and tested in the presence of the Engineer.

(xii) All exposed hot-water pipes shall be lagged as specified.

(xiii) All pipework and fittings shall be pressure tested and sterilised as specified.

(xiv) Valves shall be installed on all branch pipes and ball-o-stop valves on all connectors to basin pillar cocks, sink mixers, cistern type WCs and other fittings.

(xv) Approved type expansion bellows shall be installed where required for expansion and contraction to prevent excessive stain on fittings and pipe joints.

(f) <u>uPVC underground pipe installations</u>

(i) uPVC piping shall conform to SANS 966 with rubber ring type joints.

(ii) All bends shall be uPVC type fittings with rubber ring joints.

(iii) All other fittings such as T-pieces, reducers, flanges, etc, shall be bitumen-dipped cast iron rubber ring jointed fittings to SANS 546.

(iv) No solvent weld type fittings will be allowed.

(v) All cast iron fittings shall be coated and wrapped to SANS 1117.

(vi) All pipes shall be laid on a 100 mm sand-bedding cradle and covered with 300 mm sand before backfilling.

(vii) All backfilling shall be to the Engineer's specification and approval.

(viii) Pipe trenching and bedding shall be as follows:

AREA	MINIMUM COVER	BEDDING TYPE	MAIN FILL
Vehicle traffic	1 100	Flexible pipe bedding as per SANS 1200 LB	Soilcrete
Under surface bed	600		Soilcrete
Other areas	900		90% of modified AASHTO density

(ix) All thrust blocks shall be cast between the pipe and the undisturbed trench material.

(x) No concrete shall come into direct contact with the uPVC pipe. At the thrust blocks the bend shall be wrapped with Densopol 80 HT Tape or approved equivalent.

(xi) DPE pipe connections to UPVC pipes up to 50 mm diameter can be done by means of SG iron manufactured saddles with the appropriate gaskets and cadmium-plated bolts and nuts.

(xii) All pipe crossings under traffic areas shall be backfilled with soilcrete and compacted as specified.

(xiii) All pipework shall be pressure tested with all joints uncovered, to the satisfaction of the Engineer.

(xiv) Suitably sized air release valves built into valve chambers shall be installed at all high points of the pipeline.

(g) <u>HDPe underground pipe installations</u>

(i) HDPe piping shall be Type 4 HDPe pipe to SANS 533.

(ii) All fittings shall be of Plasson compression type, conforming to ISO/DIS 3458.

(iii) All pipes shall be laid on a 100 mm sand bedding cradle and covered with 300 mm of sand of selected material.

(iv) All backfilling shall be to the Engineer’s specification and approval.

(v) Pipe trenching and bedding shall be as follows:

AREA	MINIMUM COVER	BEDDING TYPE	MAIN FILL
Vehicle traffic	1 100	Flexible pipe bedding as per SANS 1200 LB	Soilcrete
Under surface bed	600		Soilcrete
Other areas	900		90% of modified AASHTO density

(vi) No concrete shall come into direct contact with the HDPe pipe. At these points the fittings shall be wrapped with a Densopol 80 HT tape or approved equivalent.

(vii) All pipe crossings under traffic areas shall be backfilled with soilcrete and compacted as specified.

(viii) All pipework shall be pressure tested with all joints uncovered to the satisfaction of the Engineer.

(ix) Suitably sized air release valves built into valve chambers shall be installed at all high points of the pipeline.

(h) Valves

(i) Gate valves underground in valve chambers to connect to uPVC piping (65 mm NB and larger)

Gate valves are to be equipped with non-rising spindle, spherical graphite iron body to SANS 936 Grade 42, cast-iron nitrile butadine rubber-covered gate, stainless steel spindle, nitrile butadine rubber O-rings and seals, cast iron bonnet and gunmetal thrust collar to BS 1400 LG2.

The valve shall conform to SANS 664 and/or 665, and shall be capable of withstanding a working pressure of 1 600 kPa.

The valve shall be fitted with a square key spindle top to close the valve in a clockwise direction and socket ends to SANS 665 to fit into uPVC Class 12 pipe and installed to detail.

(ii) Gate valves underground in valve chamber to connect to HDPe piping

The gate valves shall be of the dezinctified brass type with brass gate, brass body, non-rising spindle and BSP threaded socket ends. The valve shall conform to SANS 776 Class 125. The valve shall be able to withstand a working pressure of 1 600 kPa. The valve shall be fitted with a hand wheel on an extended spindle shaft of 700 mm to close in a clockwise direction and installed to detail.

(iii) Gate valves above ground for temperatures up to 40 °C to connect to steel piping (65 mm NB and larger)

Gate valves to be equipped with non-rising spindle, spherical graphite iron body to SANS 936 Grade 42, cast-iron nitrile butadine rubber-covered gate, stainless steel spindle, nitrile butadine rubber O-rings and seals, cast iron bonnet and gunmetal thrust collar to BS 1400 LG2.

The valve shall conform to SANS 664 and/or 665, and shall be capable of withstanding a working pressure of 1 600 kPa.
The valves shall be fitted with flanged ends to SANS 1123/1600, hand wheel to close the valve in a clockwise direction and installed in an upright position or side ways to a maximum 90° from upright.

(iv) Gate valves above ground for temperatures above 40 °C to connect to steel piping (65 mm NB and larger)

Gate valve shall be equipped with non-rising spindle, spherical graphite iron body to SANS 963 Grade 42, cast-iron gate, gunmetal seat and gate rings, high-tensile bronze spindle, cast-iron bonnet and gunmetal thrust collar to BS 1400 LG2.

The valve shall conform to SANS 665 and shall be capable of withstanding a working pressure of 1 600 kPa and a temperature of 90 °C.

The valve shall be fitted with flanged ends to SANS 1123/1600, hand wheel to close the valve in a clockwise direction and installed in an upright position or sideways to a maximum 90° from upright.

(v) Gate valves above-ground to fit to copper pipes (65 mm NB and larger)

Gate valves shall be equipped with non-rising spindle, gunmetal bronze or dezinctified brass body, gunmetal or dezinctified brass gate, graphite asbestos packing in the gland.

The valve shall be fitted with a hand wheel to close in a clockwise direction and installed in an upright position or sideways to maximum 90° from upright.

The valve shall be equipped with flanges to SANS 1123/1600, hand wheel to close the valve in a clockwise direction and installed in an upright position or sideways to a maximum 90° from upright.

(vi) Gate valves above-ground for temperatures up to 100 °C (up to 50 mm NB)

The gate valves shall be of the dezinctified brass type with brass gate, brass body, non-rising spindle and BSP threaded socket ends. The valve shall conform to SANS 776-1965 Class 125.

The valve shall be able to withstand a working pressure of 1 600 kPa.

The valve shall be equipped with a hand wheel to close in a clockwise direction.

The valve shall be installed in an upright position or sideways to a maximum 90° from upright and shall be so placed with other fittings to be removable without cutting the pipework.

(vii) Ball-O-Stop valves (15 mm diameter - 25 mm diameter)

This valve shall be a full-way ballcock type with BSP threaded ends. This valve shall conform to SANS 1056 Part 3, 1985, shall be rated for a test pressure of 2 000 kPa, and shall be chrome-finished where exposed.

(viii) Angle regulating valves

This valve shall be a 15 mm diameter chromium-plated angel regulating valve with a 350 mm chromium-plated copper tube and cap nuts where required.

(i) <u>Strainers</u>

(i) Strainers for connection to steel or uPVC pipes (65 mm NB and larger)

These strainers shall be of the Y-type with cast iron body, stainless steel or bronze strainer element and shall be equipped with flanged ends to SANS 1123/1600. The whole size of the strainer element shall be maximum 1 mm diameter and be removable without dismantling of pipework. The strainer shall be suitable for a temperature of up to 90 °C at a 1 000 kPa pressure rating and installed with the element facing downwards or a maximum of 45° sideways.

(ii) Strainers for connection to steel and copper pipes (up to 50 mm NB)

The strainers shall be of the Y-type with bronze or dezinctified brass body, stainless steel strainer element and must be equipped with BSP threaded socket ends. The whole size of the strainer element shall be maximum 0,8 mm diameter. The strainer shall be suitable for a temperature of up to 90 °C at a pressure rating of 1 000 kPa and installed with the element facing downwards or a maximum of 45° sideways.

(j) Non-return valves

(i) Non-return valves for cold water (65 mm NB and larger)

The non-return valve shall be of the spring-loaded dual flap plate type fitted between two flanges (wafer).

The non-return valve shall be equipped with a cast-iron body, aluminium bronze plates, stainless steel springs and neoprene seals on the plates. The valves shall be suitable for a working pressure of 1 000 kPa.

(ii) Non-return valves for hot water (up to 100 mm diameter) and cold water (up to 50 mm NB)

The non-return valve shall be of the spring-loaded piston type, with bronze or dezinctified brass body, stainless steel spring and bronze disc with neoprene seal fitted with BSP threaded socket ends. The valve shall be suitable for a working pressure of 1 000 kPa and a temperature of up to 90 °C. All valves shall be installed as to be removable without extensive pipework removal.

(k) Air release valves and vacuum breakers

(i) Double orifice double-acting air release valves with sizes from 50 mm NB to 200 mm NB

The air release valve shall be fitted with small and large orifice. The air release valve shall be fitted with a cast-iron or stainless steel body, stainless steel or fibreglass balls, integral shut-off valve and flanged ends to SANS 1123/1600. The valve shall be equipped with an anti-shock facility.

The valve shall be suitable for maximum pressure of 1 600 kPa.

(ii) Single orifice air release valves for main water lines with sizes from 25 mm NB to 50 mm NB

The air release valve shall be fitted with a small orifice, cast-ron or stainless steel body, fibre glass or stainless steel ball float and BSP threaded inlet.

When the valve is installed a shut-off valve shall be installed on the inlet side. The valve shall be equipped with an anti-shock facility.

The valve shall be suitable for maximum pressure of 1 600 kPa.

(iii) Single orifice double purpose air release valves for domestic water lines up to 15 mm NB

The air release valves shall be fitted with a stainless steel float, brass or cast steel body with an integral shut-off valve fitted.

The valve shall be capable to withstand a working pressure of 1 000 kPa at 110 °C.

(iv) Vacuum breaker up to 40 mm diameter

The vacuum breakers shall be fitted with neoprene seal, spring-loaded disc in a dezinctified brass or bronze body. The valve shall seal watertight and shall be designed to withstand a working pressure of 1 000 kPa and a temperature of 90 °C.

(l) Pressure-reducing valves

(i) Combination pressure reducing stations

Where a high peak flow can occur as well as a small flow and the small flow is out of the range of the large pressure-reducing valve, a small pressure-reducing valve shall be installed in parallel with the large pressure-reducing valve. The two pressure-reducing valves in parallel shall be set according to the manufacturer's specification.

(ii) Large pressure-reducing valves (65 mm NB and larger)

The pressure reducing valve shall be equipped with a cast iron body, neoprene-nylon reinforced diaphragm, bronze seal disc washer, stainless steel shaft and flanged ends. The valve shall be pilot operated and shall be designed to handle high flows at a minimum head loss.

The valve must be adjustable to handle a wide range of incoming pressure at a constant downstream pressure.

The valve shall be equipped with flanged ends to SANS 1123/1600.

(iii) Small pressure-reducing valves (15 mm NB - 50 mm NB)

The pressure-reducing valve shall be equipped with brass body, balanced single seat and integral strainer. The valve shall be able to handle a wide range of incoming pressure while the downstream pressure stays constant with maximum inlet pressure of 1 000 kPa and a maximum water temperature of 40 °C.

The valve shall be equipped with BSP male threaded brass union couplings.

(m) Water meters

(i) Combination water meters

Where high peak flow as well as a low flow can occur, and the low flow is out of the registration range of large water meter, a small diameter water meter shall be installed in parallel with the large water meter to cater for the low flows with integral automatic change-over valves. These valves shall be designed to have a minimum pressure drop at the operating point.

(ii) Water meters (50 mm NB and larger)

These water meters shall be of the dry type with all gears and transmission and roller counters in a dry head, and shall be equipped with flanged ends to SANS 1123, cast-iron body with high quality corrosion proof coating. The meter must be protected from magnetic fields and sealed to prevent tampering with adjustments. The meter must be able to work up to a pressure of 1600 kPa under a maximum water temperature of 40 °C. The scale of meter must be in cubic metre (m^3) and equipped with needle indicators reading in litres. The accuracy of the meter shall be not less than 98 %.

The meters shall be installed with leading and trailing lengths of pipes to the manufacturer's specification.

(iii) Water meters (up to 50 mm NB)

The meter shall be of the volumetric rotary piston type with brass body equipped with union couplers. The meter reading must be in kilolitres. The meter shall have an accuracy of not less than 98 %. The meter must be able to operate up to a water pressure of 1000 kPa at a water temperature of 40 °C.

The meters shall be installed with leading and trailing lengths of pipes to the manufacturers specification.

CE 04.03 FIRE WATER PIPED RETICULATION NETWORKS

CE 04.03.01 General

Repair work to the fire water piped reticulation networks is detailed in the Particular Specification and shall include but no be limited to the work described below. This specification only covers the water piped reticulation for the fire water protection system, whereas the equipment to this installation, such as fire hydrants, hose reels and extinguishers, are covered and detailed in Technical Specification JC: Conventional Fire Fighting Equipment. This specification must be read in conjunction with the afore-mentioned specification.

Repair work to the fire water piped reticulation networks may include the following:

(a) Replacement of damaged, broken, leaking, corroded above-ground and underground pipe work, fittings and equipment;

(b) Repair, replace and service valves which shall include new gaskets, gland packings, seals, bolt and nuts, etc;

(c) Where valves do not close properly, all these valves are to be refurbished, descaled and if necessary replaced;

(d) Repair, service and check the proper functioning of all non-return valves and backflow preventers;

(e) Repair, service, readjust and calibrate all pressure gauges;

(f) Repair work to bracketing systems including fixing and repair of existing brackets and the introduction of additional brackets where required;

(g) Report all related problems to fire fighting equipment to the Engineer;

(h) Water storage tanks are to be emptied, cleaned out, repaired, sealed and put back into operation. Ball float or/and filling valves to these tanks are to be serviced and repaired where required;

(i) Pressure test and sterilise repaired new installation and equipment;

(j) Reinstatement and making good of walls, tiling, floors, concrete, finishes, holes, chases, surfaces, etc, to an acceptable level where any repair, upgrade and/or service work have been executed;

(k) Record pressure readings on supply to installation.

CE 04.03.02 Material and equipment specification for fire water piped reticulation networks

Materials and equipment to be used for repair items shall be suitable and/or adaptable to the existing installation and shall comply with the relevant specification.

CE 04.04 CLEANING OF PIPELINES

The work under this section involves the removal of silt, debris and lime deposits from within the pipelines and the general cleaning in areas resulting from leakage.

CE 04.04.01 Construction

Prior to the cleaning of any pipeline sections, the Contractor shall arrange with the Engineer for an inspection of the pipe route. Based on the inspection, the Engineer will instruct the Contractor as to which sections of the network require cleaning.

Visual inspections utilising check circuit TV cameras will not be required unless deemed essential on large diameter pipelines.

Sections of the pipeline may be removed for a more detailed inspection. Such sections will be repaired as specified in Subclause CE 04.02. Sections will only be cut from the pipeline where specifically instructed by the Engineer.

The method to be applied for the cleaning of the pipelines will be chemical or mechanical and shall be followed by disinfection of the related section. The method to be applied for each section of the pipeline will be instructed by the Engineer.

Material removed from the pipelines shall be disposed of as instructed by the Engineer.
The Contractor shall discuss the method proposed for the scouring of the pipelines where insufficient scour valves are present with the Engineer prior to implementation.

CE 04.04.02 Quality standard

Pipelines shall be cleaned such that head losses along the pipe route are negligible under simulated fire flow, when measured at convenient points along the route.

CE 04.05 REPAIR OF FITTINGS

CE 04.05.01 Construction

The Engineer will indicate the fittings that are to be repaired.

The repair of the following fittings may be required:

(a) Gate valves
(b) Fire hydrants
(c) Viking Johnson couplings
(d) Pressure-reducing valves
(e) Ferrules
(f) Domestic water meters
(g) Bulk water meters
(h) Stop-cocks
(i) Tees
(j) Bends
(k) End caps
(l) Saddles
(m) Sprinklers.

CE 04.06 REPAIR OF STRUCTURES

The Engineer will indicate the structures that are to be repaired or cleaned from debris.

Damaged existing structures shall be demolished to the extent directed by the Engineer on site and the resulting debris and other debris spoiled at designated sites.

The reinstatement of damaged structures shall be carried out to the same standards prescribed for new construction.

CE 05 TESTS AND INSPECTIONS ON COMPLETION

Except where otherwise provided in the Contract, the Contractor shall provide all labour, materials, power, fuel, accessories and properly calibrated and certified instruments necessary for carrying out such tests. The Contractor shall make arrangements for such tests and he shall give at least 72 hours notice to the Engineer, in writing, prior to commencement of the test.

In the event of the plant or installation not passing the test, the Employer shall be at liberty to deduct from the Contract price all reasonable expenses incurred by the Employer or the Engineer attending the repeated test.

Whenever any installation or equipment is operated for testing or adjusting as provided for above, the Contractor shall operate the entire system for as long a period as may be required to prove satisfactory performance at all times in the occupied space served by that system for up to twenty-four hours a day continuously until the system is handed over.

The Contractor shall provide all labour and supervision required for such operation and the Employer may assign operating personnel as observers, but such observation time shall not be counted as instruction time.

After complete installation of the system all equipment shall be tested, adjusted and readjusted until it operates to the satisfaction and approval of the Engineer.

The Contractor shall submit certificates of tests carried out to prove the quality and proper functioning of all equipment and also certificates to be obtained from all relevant authorities and statutory bodies, etc.

CE 06 QUALITY ASSURANCE SYSTEM

The Contractor shall institute an approved quality assurance (QA) system which shall be submitted to the Employer or Engineer for approval. The records of this QA system shall be kept throughout the duration of the Contract and be submitted to the Engineer at regular intervals as required.

CE 07 MAINTENANCE TO INSTALLATION SYSTEMS AND EQUIPMENT

CE 07.01 GENERAL

This part of the Contract shall include routine preventative maintenance, corrective maintenance and breakdown maintenance as described in Additional Specification SA: General Maintenance.

The maintenance work to be performed and executed shall be done strictly in accordance with Additional Specification SA: General Maintenance, and as specified in the Particular Specification and this specification.

The said maintenance work shall be executed in accordance with the relevant codes of practice, standards, regulations, municipal laws and by-laws and the manufacturer's specifications and codes of practice.

The maintenance schedules and frequency shall be developed under the maintenance control plan to be implemented by the Contractor.

All new equipment, components and materials supplied and installed under the maintenance Contract shall be furnished with the prescribed manufacturer's guarantees.

The maintenance work and items are categorised for each maintenance activity under the following headings:

(a) Repair of water distribution pipelines (see table CE 07.02/1)
(b) Cleaning of existing pipelines (see table CE 07.02/2)
(c) Repair of fittings (see table CE 07.02/3)
(d) Repair of existing structures (see table CE 07.02/4)
(e) Fire water piped reticulation structures (see table CE 07.02/5).

CE 07.02 ROUTINE PREVENTATIVE MAINTENANCE

This routine maintenance of the installations, systems and equipment shall be done in accordance with Additional Specification SA: General Maintenance and the Particular Specification related to this work.

The routine maintenance work to be performed and executed shall include, but not be limited to the following items listed in the tables below under each heading.

These actions and findings shall be logged and reported on the relevant approved schedules and reports.

TABLE CE 07.02/1 REPAIR OF WATER DISTRIBUTION PIPELINES

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCE FREQUENCY
1	Visually inspect and report on complete system	Monthly
2	Log all water meter readings	Monthly
3	Log all pressure gauge readings	Monthly
4	Check, inspect, report and repair leaks/replace rotten pipes where required	Monthly
5	Sample water supply and chemical analyses to be provided by approved company	Annually
6	Water storage tanks to be emptied, cleaned out, inspected, repaired and resealed where necessary	Annually
8	Clean out all strainers	Monthly
9	Check, inspect, repair or replace all bracketing systems	Four-monthly
10	Paint repairs to piping, fittings and equipment	Annually

TABLE CE 07.02/2 CLEANING OF EXISTING PIPELINES

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCE FREQUENCY
1	Visually inspect and report on complete system	Monthly
2	Remove silt, debris and loose lime deposits from within pipelines where required by scouring	Annually
3	Do general cleaning in areas where leakage has occurred	Six-monthly

TABLE CE 07.02/3 REPAIR OF FITTINGS

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCE FREQUENCY
1	Replace all valve gaskets, gland packings and seals	Annually
2	Check, inspect, service, repair and readjust all pressure reducing valves	Annually
3	Check, inspect and test operation of all valves on site	Four-monthly
4	Check, inspect, service, test and repair/replace all safety and expansion release valves	Six-monthly
5	Check, inspect, service, test and repair/replace all air release valves and vacuum breakers	Four-monthly
6	Check, service, repair or replace all ball float valves	Six-monthly
7	Check, inspect, test, service and repair/replace all non-return valves	Four-monthly

TABLE CE 07.02/4 REPAIR OF EXISTING STRUCTURES

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCE FREQUENCY
1	Visually inspect and report on all water distribution related structures	Monthly
2	Clean out structures of debris	Annually

TABLE CE 07.02/5 FIRE WATER PIPED RETICULATION STRUCTURES

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCE FREQUENCY
1	Visually inspect and report on complete system	Monthly
2	Report any failures/breakage of fire fighting equipment to the Engineer	Monthly
3	Log all pressure gauge readings	Monthly
4	Replace all valve gaskets, gland packings and seals	Annually
5	Clean out water storage tanks and reseal/repair if necessary	Annually

6	Check, inspect, service, repair/replace all non-return valves and backflow presenters	Four-monthly
7	Check, inspect, report and repair all leaks/replace rotten pipes where required	Monthly
8	Inspect, service, readjust and calibrate all pressure gauges	Four-monthly
9	Paint repairs to piping, fittings and equipment	Annually
10	Check, inspect, repair or replace all bracketing systems	Four-monthly

CE 07.03 CORRECTIVE MAINTENANCE

This corrective maintenance of the installations, systems and equipment to be done in accordance with Additional Specification SA: General Maintenance and the Particular Specification related to this work.

The Contractor shall inspect and check all equipment, materials, systems and installation for any pending breakdowns, maladjustments or anomalies of equipment.

The Contractor shall report and take actions to correct such deficiencies.

CE 07.04 BREAKDOWN MAINTENANCE

Breakdown maintenance of the installations, systems and equipment shall be done in accordance with Additional Specification SA: General Maintenance.

All breakdown problems experienced shall be acted upon within the time limitations allowed in the General Maintenance specification.
All breakdown maintenance shall be done in accordance with the related specifications, standards, regulations and codes.

The Contractor shall have access to the necessary spares, equipment and tools for the expected breakdowns.

CE 08 MEASUREMENT AND PAYMENT

CE.01 WATER DISTRIBUTION PIPELINES

CE.01.01 Repair of existing pipelines ..... Unit: metre (m)

The unit of measurement shall be per metre length of pipe replaced. In each case the Contractor shall agree on the length of pipe to be replaced and the method of coupling the pipes.

The tendered rate shall include full compensation for cleaning and grubbing, excavation, removal of existing pipeline, dealing with water logged conditions, provision of bedding and additional backfill, logging and backfilling of replacement pipeline, finishing, repair of kerbs, road surfaces, accommodation of traffic, excavation in all materials, removal of unsuitable material from the trench, disposal of surplus materials.

Separate items will be scheduled for house connections and distribution pipes.

The provision of the materials will be measured separately under CE 01.02.

CE.01.02 Provision of materials

(a) Pipelines ..... Unit: metre (m)

The unit of measurement shall be the metre of pipe replaced.

(b) Fittings .....Unit: number
The unit of measurement shall be the number of fittings installed.

The tendered rates shall include full compensation for all transport to the place of installation, storage, labour costs.

Separate pay items shall be listed for the pipe materials and fittings per diameter and class.

CE.01.03 Replacement of manhole covers, grid inlets and the like

(a) SANS 558 Type 4 - covers, grids, etc, only:

(i) Maximum dimension up to 300 mm .....Unit: number
(ii) Maximum dimension 301 mm - 600 mm .....Unit: number
(iii) Maximum dimension 601 mm - 900 mm .....Unit: number
(iv) Maximum dimension over 900 mm .....Unit: number

(b) SANS 558 Type 4 - frames only for covers, grids, etc:

(i) Maximum dimension up to 300 mm .....Unit: number
(ii) Maximum dimension 301 mm - 600 mm .....Unit: number
(iii) Maximum dimension 601 mm - 900 mm .....Unit: number
(iv) Maximum dimension over 900 mm .....Unit: number

(c) SANS 558 Type 2A - covers, grids, etc, only:

(i) Maximum dimension up to 300 mm .....Unit: number
(ii) Maximum dimension 301 mm - 600 mm .....Unit: number
(iii) Maximum dimension 601 mm - 900 mm .....Unit: number
(iv) Maximum dimension over 900 mm .....Unit: number

(d) SANS 558 Type 2A - frames only for covers, grids, etc:

(i) Maximum dimension up to 300 mm .....Unit: number
(ii) Maximum dimension 301 mm - 600 mm .....Unit: number
(iii) Maximum dimension 601 mm - 900 mm .....Unit: number
(iv) Maximum dimension over 900 mm .....Unit: number

The unit of measurement shall be the number of covers or frames installed. The classification of the size of each cover or frame will be based on the nominal dimensions of the unit and not on the actual dimensions.

The tendered rates shall include full compensation for procuring, furnishing and placing the new covers, grids and/or frames. The tendered rates shall also include full compensation for removing and disposing of the damaged covers, grids and/or frames from the site.

CE.01.04 **Repair of corrosion protection**

Corrosion protection of pipes with diameters of:

(a) Up to 100 mm dia ..... Unit: metre (m)

(b) 101 to 200 mm dia ..... Unit: metre (m)

(c) 201 to 300 mm dia ..... Unit: metre (m)

(d) 301 to 400 mm dia ..... Unit: metre (m)

The unit of measurement shall be meter length of pipe painted with corrosion protection in accordance with Specification LB: Corrosion protection.

The tendered rate shall include full compensation for preparation of pipe fittings, application of corrosion protection and curing of corrosion protection.

Separate items shall be scheduled for different types of pipework.

CE.01.05 **New Pipelines: Preparation and Finishing** ..... Unit: metre (m)

The unit of measurement shall be per metre length of pipe being replaced. In each case the Contractor shall agree on the length of pipe to be replaced.

The tendered rate shall include full compensation for cleaning and grubbing, all excavations to the specified depth, removal of existing pipeline, dealing with water logged conditions, provision of bedding and additional backfill, logging and backfilling of replacement pipeline, finishing, repair of kerbs, road surfaces, accommodation of traffic, excavation in all materials, removal of unsuitable material from the trench, disposal of surplus materials and pressure testing of the completed pipeline.

The provision of the pipeline materials will be measured separately under CE 01.02.

CE.02 REPAIR OF FIRE WATER PIPE RETICULATION NETWORK

Measurement and payment items from CE.01, CE.03, CE.04 and CE.05 will be utilised for work done on the external fire water pipe reticulation. Additional payment items for specialist fittings shall be paid under Specification JC.

CE.03 CLEANING OF PIPELINE

CE.03.01 **Cleaning of deposits in pipeline by mechanical means for pipes of diameters of:**

(a) Up to 100 mm dia ..... Unit: metre (m)

(b) 101 to 200 mm dia ..... Unit: metre (m)

(c) 201 to 300 mm dia ..... Unit: metre (m)

(d) 301 to 400 mm dia ..... Unit: metre (m)

CE.03.02 **Scouring of pipeline to remove trapped debris for pipes of diameters of:**

(a) Up to 100 mm dia ..... Unit: metre (m)

(b) 101 to 200 mm dia ..... Unit: metre (m)

(c) 201 to 300 mm dia ..... Unit: metre (m)

(d) 301 to 400 mm dia ..... Unit: metre (m)

The unit of measurement shall be metre length of pipe cleaned or scoured.

The unit rate of measurement for item CA.03.01 shall include full compensation for the emptying of the pipeline, cleaning, refilling and reporting on the condition of the pipe after cleaning. The rate shall also include the disposal of waste material in and appropriate manner.

The unit of measurement for item CA.03.02 shall include full compensation for the scouring of the pipeline and refurbishing of the pipeline. The unit of measurement shall be the total length of filled pipeline from which the water is scoured. The length shall be agreed with the Engineer prior to scouring.

The provision of additional scour points shall also be included in the rate.

CE.04 REPAIR OF FITTINGS

CE.04.01 Servicing of valves .....Unit: number

The unit of measurement shall be the number of valves serviced.

The tendered rate shall include full compensation for cleaning, removing rust, scale or other solids from surfaces or moving parts, proper greasing of all moving parts, preparation for corrosion protection coating and painting of valves.

Separate items will be listed in the Schedule of Quantities for different types and sizes of equipment.

CE.04.02 Recondition valves .....Unit: number

The unit of measurement shall be the number of valves reconditioned.

The tendered rate shall include full compensation for dismantling, cleaning, removing rust, removing scale or other solids from surfaces and moving parts, replacing components such as hinges, spindles, hard wheels or gates, swing axles, swing gates, replacing or repair of seals, skimming of seal surfaces, proper greasing of all moving parts, preparation for corrosion protection, painting or any other action or cost necessitated to recondition a value to a perfect functional drop tight condition.
Separate items will be listed in the Schedule of Quantities for different types and sizes of equipment.

CE.04.03 Decommission and remove valves .....Unit: number

The unit of measurement shall be the number of valves decommissioned and removed.

The tendered rate shall include full compensation for all labour and equipment required to decommission and remove valves, such as installation of temporary isolating valves or blank flanges, removal of unserviceable valves, loosening and removal of bolts and nuts, or any other related action required. Excavation to exposed partially buried valves shall also be included in the rate.

Separate items will be scheduled in the Schedule of Quantities for different types and sizes of valves.

CE.04.04 **Install and Commission valves** .....Unit: number

The unit of measurement shall be the number of valves commissioned and installed.

The tendered rate shall include full compensation for all labour and equipment required to commission and installation valves, such as installation of temporary isolating valves or blank flanges, removal of unserviceable valves, loosening and removal of bolts and nuts, or any other related action required. Excavation to exposed partially buried valves shall also be included in the rate.

Separate items will be scheduled in the Schedule of Quantities for different types and sizes of valves.

CE.04.05 **Supply and install valves** .....Unit: number

The unit of measurement shall be the number of valves supplied and installed.

The tendered rate shall include full compensation for all labour and equipment required to supply and installation of valves, such as, removal of unserviceable valves, loosening and removal of bolts and nuts, or any other related action required. Excavation to exposed partially buried valves shall also be included in the rate.

Separate items will be scheduled in the Schedule of Quantities for different types and sizes of valves.

CE.04.06 **Repair of house connections** .....Unit: number

The unit of measurement shall be the number of house connections repaired.

The tendered rate shall exclude the provision of new fittings measured under CE. 01.02 but shall otherwise include full compensation for appurtenant fittings, excavation, backfilling and other necessary work to repair existing house connections. All connections to the distribution pipelines, up to a diameter of 32 mm shall be measured as "house connections".

CE.05 REPAIR OF STRUCTURES

CE.05.01 Demolition and removal of damaged existing structures

(a) Plain concrete ..... Unit: cubic metre (m^3)

(b) Reinforced concrete ..... Unit: cubic metre (m^3)

(c) Brickwork .....Unit: square metre (m^2)

(d) Precast concrete manhole sections .....Unit: number

The unit of measurement for CE.05.01(a) and (b) shall be the cubic metre of existing material demolished, determined from 70 % of the rated cubic metre capacity of the truck used to remove the material.

The unit of measurement for CE.05.01(c) and (d) shall be the square metre length of brickwork and the number of precast concrete manhole sections.

The tendered rates shall include full compensation for all labour, equipment and tools for removal of the damaged sections, trimming the bedding and for loading, transporting and disposing of the material. Excavation and backfill shall also be included for constructing the precast concrete manholes inclusive of all work required to complete the work as shown on the drawings.

The reinstatement of damaged sections shall be paid for under the relevant items for constructing new structures.

CE.05.02 **Cleaning of existing manholes, chambers and other structures** ..... Unit: cubic metre (m^3)

The unit of measurement shall be the cubic metre of debris and other material to be disposed, removed from manholes, chambers and other structures.

The tendered rates shall include full compensation for all labour, equipment and tools for removal of the material, trimming the bedding and for loading, transporting and disposing of the material.

CE.05.03 **Overhaul on material for haul in excess of 1,0 km**

(a) Excavated material to spoil ..... Unit: cubic metre kilometre (m^3-km)

(b) Existing structures demolished ..... Unit: cubic metre kilometre (m^3-km)

The unit of measurement shall be the cubic metre of loose material hauled in excess of 1,0 km, measured according to the rated capacity of the truck used, multiplied by the average overhaul distance. All trucks shall be fully loaded to their rated capacity.

The tendered rate shall include full compensation for hauling the material in excess of the free-haul distance.

CE.05.04 **Repair of structures**

(a) Brickwork ..... Unit: square metre (m^2)

(b) Concrete ..... Unit: cubic metre (m^3)

(c) Precast concrete manhole sections ..... Unit: number

The unit of measurement shall be the cubic metre of brickwork or concrete constructed.

The tendered rate shall include full compensation for the provision of materials, transport, preparation and placing of foundations, labour and all other associated work to complete the work required.
Separate items will be scheduled for specific installations.

CE.05.05 **Marker posts** ..... Unit: number

The unit of measurement shall be the number of marker posts installed.

The tendered rate shall include full compensation for the manufacture and installation complete as shown on the drawings.

CE.05.06 **Sample testing**

(a) Extract sample to determine lime deposition, corrosion and general condition for pipes of:

(i) Up to 100 mm dia ..... Unit: number

(ii) 101 to 200 mm dia ..... Unit: number

(iii) 201 to 300 mm dia ..... Unit: number

(iv) 301 to 400 mm dia ..... Unit: number

The unit rate of measurement shall be the number of sample tests carried out.

The tendered rate shall include full compensation for cutting into pipe and extraction of sample, visual inspection and reporting on condition of pipe. The tendered rate shall also include full compensation for the appropriate disposal of the sample and for the repair of the section pipeline.

Compensation for provision of new pipes and fittings, shall be measured under CE 01.

CE.05.07 New structures

Precast concrete manhole sections.....Unit: number

The unit of measurement shall be the number of new pre-cast manholes constructed complete with precast top, manhole frame, cover and finishing.

The tendered rate shall include full compensation for the provision of materials, transport, preparation and placing of foundations, labour and all other associated work to complete the work required.

CE.06 TESTS AND INSPECTIONS OF REPAIR WORK

CE.06.01 Pressure testing

(a) Pressure test pipeline in sections of pipes with diameter of:

(i) Up to 100 mm dia ..... Unit: metre (m)

(ii) 101 to 200 mm dia..... Unit: metre (m)

(iii) 201 to 300 mm dia..... Unit: metre (m)

(iv) 301 to 400 mm dia..... Unit: metre (m)

The unit of measurement shall be the metre length of pipe tested.

The tendered rate shall include full compensation for isolation of test section, filling of section with water, testing for required duration and reporting on performance of pipes, the provision of any additional water shall also be included in the rate. The rate shall also include the provision of all equipment, labour and supervision necessary for the completion of the pressure test.

CE.06.02 Provision of equipment for visual inspection of underground pipeline network ..... Unit: lump sum

The tendered sum shall include full compensation for the provision of suitable equipment, such as torches, lights and mirrors, etc, to enable a basic visual inspection of the pipeline network.

CE.06.03 CCTV inspection of underground pipework

(a) Pipes of diameter:

(i) Up to 300 mm dia ..... Unit: metre (m)

(ii) 301 to 600 mm dia..... Unit: metre (m)

The unit of measurement shall be the metre length of pipe inspected.

The tendered rate shall include full compensation for all inter-pipe relocations required to conduct a thorough check of the pipework where indicated by the Engineer.

CE.07 LOCATE AND CONNECT INTO THE EXISTING WATER NETWORK

(a) Locate and connect into the existing water network pipeline.....Unit: number

The tendered rate shall include the provision of all equipment, labour, fittings and material required to locate the existing water network pipeline, excavate and expose the existing pipe, blank off any unnecessary connections, and connect to the new pipeline.

ADDITIONAL SPECIFICATION

SB OPERATING AND MAINTENANCE MANUALS FOR MECHANICAL AND ELECTRICAL EQUIPMENT/ INSTALLATIONS

CONTENTS

SB 01 SCOPE
SB 02 PROCEDURE FOR SUBMISSION OF MANUALS
SB 03 FORMAT OF OPERATING AND MAINTENANCE MANUALS
SB 04 CONTENTS OF OPERATING AND MAINTENANCE MANUALS
SB 05 MEASUREMENT AND PAYMENT

SB 01 SCOPE

The Contractor shall be responsible for the acquiring and compilation of complete sets of Operating and Maintenance Manuals for all Mechanical and Electrical equipment and installations. A separate Operating and Maintenance Manual shall be supplied for each installation where required

SB 02 PROCEDURE FOR SUBMISSION OF MANUALS

SB 02.01 SUBMISSION OF DRAFT MANUALS

A draft copy of each Operating and Maintenance Manual shall be submitted to the Engineer prior to safety inspection of the installation. Approval of the draft Operating and Maintenance Manuals shall be a prerequisite for commencement of the safety inspection in terms of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)

Where and installation has an existing Operating and Maintenance Manual, the Contractor shall check whether its contents are still applicable and accurate. When drawing up his own Operating and Maintenance Manual for the installation, the Contractor shall incorporate there in all such existing applicable data. The existing Operating and Maintenance Manual shall then be disposed of provided written permission to do so have been obtained from the Engineer.

The manuals will be reviewed and checked by the Engineer and returned to the Contractor with comments, where necessary. The Contractor shall make the necessary changes and amendments to the manuals to incorporate the Engineer's comments.

SB 02.02 DEVELOPMENT OF FINAL MANUALS

A final draft copy of each Operating and Maintenance Manual shall be submitted to the Engineer at least one week prior to commencement of Day 1 tests on commissioning. This set of manuals will not be accepted without the Contractor's verification of the information contained in the manuals and the professional language editing thereof. The Engineer shall return the manuals to the Contractor, who shall make the final corrections. The Engineer will, however, not be responsible for the quality control on manuals. Approval of

final Operating and Maintenance Manuals shall be a prerequisite for issuing of a Certificate of Practical Completion for repair of the installation.

After the Engineer has approved the final Operating and Maintenance Manuals, the Contractor shall provide the Engineer with seven (7) sets of the manuals. Approval of the final Operating and Maintenance Manuals shall be a prerequisite for issuing of a Certificate of Completion.

SB 03 FORMAT OF OPERATING AND MAINTENANCE MANUALS

(a) Manuals shall be bound in hardcover lever-arch files with plastic coatings. The files shall be clearly labelled on the front cover, as well as on the back band, with the following information:

  (i) The title "Operating and Maintenance Manuals"

  (ii) Name of the installation (as defined in Additional Specification SA: General Maintenance)

  (iii) Name of the contract and contract number

  (iv) The Contractor's name, address and contact telephone number and fax (logo optional)

  (v) Month and year in which the manuals are finally handed over to the Employer

  (vi) Name of the User Client.

(b) Pamphlets and bound leaflets/booklets from suppliers or manufacturers shall be placed in plastic pockets.

(c) Drawings and diagrams larger than A3 shall be folded and placed in plastic pockets to be easily removed or stored.

(d) The sections of the manuals specified below shall be clearly partitioned.

(e) Cross-referencing between drawings/diagrams and text shall be in a clear
and consequent format.

(f) The Operating and Maintenance Manuals shall be supplied in English.

SB 04 CONTENTS OF OPERATING AND MAINTENANCE MANUALS

SB 04.01 TABLE OF CONTENTS

The table of contents shall appear on the second page and shall consist of the headings of the various sections in the manual and the relevant page numbers.

The table of contents shall essentially contain at least the following:

1. Introduction
   1.1 Scope of the manual
   1.2 General arrangement of the manual
   1.3 Description of installation

1.4 Specifications

2. List of drawings and diagrams

3. Parts and components

4. Operating procedures

5. Maintenance

5.1 Purpose of maintenance
5.2 Preventative maintenance
5.3 Trouble-shooting

6. Breakdown maintenance and repair

7. List of Appendices.

SB 04.02 INTRODUCTION

The introduction shall contain at least the following:

SB 04.02.01 Scope of the manual

A summary shall explain the scope of the contents.

SB 04.02.02 General arrangement of the manual

A brief description shall explain the way in which the manual is arranged.

SB 04.02.03 Description of installation

This section shall give a functional description of the complete installation covered by the manual, including all systems and/or functional units deemed to form part thereof, as defined in Additional Specification SA: General Maintenance.

SB 04.02.04 Specifications

A summary shall be given of the specifications applicable to the particular part of the Contract.

SB 04.03 DRAWINGS AND DIAGRAMS

SB 04.03.01 Mechanical flow diagrams (MFDs) and single line diagrams

Mechanical flow diagrams (for mechanical systems) or single line diagrams (for electrical systems) of the system and/or functional unit shall be included in the Operating and Maintenance Manuals for easy reference by the operators of the installation. Diagrams shall be drawn not only for parts of an installation that have been repaired, but also for the complete installation, including all the components.

SB 04.04 PARTS AND COMPONENTS

SB 04.04.01 Equipment data sheets

A data sheet shall be drawn up for each piece of equipment and/or machine forming part of the installation and shall contain the following information:

(a) Equipment tag number
(b) Equipment description
(c) Model/make/manufacturer
(d) Supplier/Reconditioning details
(e) Ordering details
(f) Details of fixed components
(g) Details of lubrication
(h) Maintenance references (refer to supplier/reconditioning technical manual).

SB 04.04.02 Technical equipment manuals

For each piece of equipment and/or machine forming part of the installation the following information shall be included in this section of the Operating and Maintenance Manuals:

(a) the supplier or reconditioning manual and/or standards of operating and maintenance instructions;

(b) illustrated parts breakdown and/or group assembly drawings as agreed with the Engineer;

(c) parts lists and data sheets, including all characteristic curves for machines indicating operation point, efficiency, power consumption, etc;

(d) calibration charts, and

(e) test certificates for hydraulic pressure tests, flame-proof grading, materials, non-destructive examinations, coating and lining details, etc.

Each detailed description shall be accompanied by a set of engineering drawings. From the drawings the functionality of each part or component used, as well as the special characteristics associated with the part or component shall be very clear.

SB 04.04.03 Parts and components list

A detailed description shall specify all the parts and components used for the duration of the Contract. This description shall include new parts and components, as well as existing parts and components that have either been reconditioned or used as specified in the Contract.

The description shall state at least the part or component number, part or component name, the size of the part or component, an explanatory description, the quantity used, the material of which the part or component is made, the coating (if any), date of purchase, as well as any relevant remarks as to the application thereof.

Details of the manufacturer of the part or component shall also be listed. This shall at least state the name, address, telephone number, fax number and name of a contact person.

The supplier of the part or component shall also be stated and shall include at least the name, address, telephone number, fax number, name of a contact person and an alternative supplier (if available).

SB 04.04.04 Drawings

Drawings shall contain a descriptive heading, an explanatory key and relevant comments. Drawings shall be done on a computer-aided design package approved by the Engineer.

A compound drawing for all subassemblies shall clearly indicate how and where the various parts fit in the subassembly. The compound drawing shall be linked to the equipment data sheets and parts and components list and shall clearly specify the parts or components used, their model numbers, their sizes and the quantities used. The compound drawings shall also be accompanied by a short description explaining the workings of the subassembly, as well as the assembly of the parts or components to complete the subassembly.

SB 04.05 OPERATING PROCEDURES

The operating instructions shall be a step by step description of the manual start-up and shut-down procedure for every piece of equipment and/or process reconditioned, repaired or supplied with references to the MFDs. For automatic operation the operators shall be referred to the automatic control manual (if applicable).

The functioning of the installation shall be clearly described, using a flow diagram depicting the interrelationships among the various subassemblies. The subassemblies shall be described by descriptive drawings.

Each mechanical or process flow diagram shall contain at least a heading, relevant comments and a key.

Every subassembly shall also have its own flow diagram explaining the operation of the subassembly, as well as the application of each part and component. The application of the subassembly shall also be very clear. The flow diagram shall consist of at least a heading, relevant comments and an explanatory key.

A detailed description shall be given of all operational systems forming part of the installation, explaining the operation and functioning of the system and the number of operations personnel required for performing the operation successfully.

The preparations, which are required before the system can be operational, shall be clearly stated and explained.

The operation tasks shall be clearly explained with reference to dangerous situations that might occur. Hazardous operations shall be explained in great detail and cover all the applicable safety precautions.

SB 04.06 MAINTENANCE

SB 04.06.01 Purpose of maintenance

The maintenance process shall be explained and the main responsibilities described.

SB 04.06.02 Preventative maintenance

A preventative maintenance and lubrication schedule shall be included in this section. This schedule shall be in table format and shall include a summary of all the maintenance actions required for each different system and/or functional unit covered by this manual, in order to give a single summary of all routine preventative maintenance actions required for the complete installation.

The schedule shall indicate daily, weekly, fortnightly, monthly and yearly maintenance actions. A lubrication schedule summary shall also be included under this section.

The frequency of routine preventative maintenance actions shall be indicated very clearly.

The Contractor shall provide the maintenance requirements as prescribed by the manufacturer. The type of maintenance shall be clearly indicated. The description of the maintenance to be performed shall include at least the part name, location of the part in either the assembly or subassembly, the model number, the quantity of the particular part or component to be maintained, the type of maintenance, and notes on the maintenance procedure.

A brief description shall accompany the maintenance schedule, indicating special tools to be used, maintenance and test equipment required for the test procedures. Any special tools necessary for maintenance shall be specified in terms of name, model, size, manufacturer, supplier (name, telephone number, fax number, contact person), coating (if any) and notes on the use of the equipment.

Remarks on the system readiness checks of each subassembly shall be explained in detail. Routine inspection and maintenance processes shall be described. It shall be very clear what needs to be done, how to perform the necessary task and any dangers that are present.

SB 04.06.03 Trouble-shooting

An explanation shall be given to assist the maintenance personnel in analysing and resolving malfunctions that might occur. Various scenarios with possible causes and rectification procedures shall be explained.

The scenarios shall be accompanied by drawings indicating the position of the part that is faulty. Each of these drawings shall have a heading, comments and an explanatory key.

SB 04.07 BREAKDOWN MAINTENANCE AND REPAIR

The Contractor shall describe the complete procedure to be followed in the event of a breakdown. It shall be very clear what the operating personnel should look for, how to eliminate any dangers due to the breakdown (eg electricity must be shut off in the event of problems with the wiring) and who

should be contacted. The Contractor shall supply the names and telephone numbers of at least two contact persons who may be contacted in the event of a breakdown.

The Contractor shall determine the reaction time for the repair to the breakdown.

Repair instructions shall provide the maintenance personnel with detailed instructions for the removal and/or replacement of any item requiring replacement due to malfunctioning. Contact numbers shall also be given to assist maintenance personnel, should a breakdown occur.

The Contractor shall specify the actions expected of maintenance personnel in the event of a breakdown.

The Contractor shall also specify the testing procedures to be followed before the system can be put into operation again. Every procedure shall be described clearly and all the potential dangers pointed out, as well as the precautions that have to be taken.

The testing procedures shall be accompanied by drawings illustrating the process to be performed. Every drawing shall have a heading, comments and an explanatory key.

SB 05 MEASUREMENT AND PAYMENT

SB 05.01 **Compile and supply a complete set of Operating and Maintenance Manuals** .....Unit : sum

The unit of measurement shall be a sum for each complete set (seven copies) of Operating and Maintenance Manuals. Operating and Maintenance Manuals for different installations shall be measured separately in the Schedule of Quantities.

The tendered sum shall include full compensation for all technical research, gathering of information, compilation of manufacturer's instructions, compilation of drawings and diagrams, and for writing of all the descriptions, instructions and functional procedures, as well as language editing, in order to provide a clear and correct set of Operating and Maintenance Manuals.

The tendered sum shall also include full compensation for all expenses such as paper, copy work, binding and printing necessary for the completion of the manuals.

The tendered sum shall also include full compensation for the compilation of draft sets of operating and maintenance manuals in accordance with the specification, and for incorporation of all comments and corrective requirements.

ADDITIONAL SPECIFICATION

SC GENERAL DECOMMISSIONING, TESTING AND COMMISSIONING PROCEDURES

CONTENTS

SC 01 SCOPE
SC 02 PHASED REPAIRS AND UPGRADING OF THE INSTALLATION
SC 03 DETAILED COMMISSIONING PROGRAMME
SC 04 COMMISSIONING COMMUNICATION CHANNELS
SC 05 COMMISSIONING RISK CONTROL AND PENALTIES
SC 06 DELAYS TO SCHEDULED SHUTDOWNS
SC 07 MATERIAL AND EQUIPMENT PROCUREMENT AND PROTECTION
SC 08 TESTING OF EQUIPMENT PRIOR TO RECOMMISSIONING
SC 09 TESTING OF MATERIAL AND EQUIPMENT SPECIFICATIONS AND WORKMANSHIP
SC 10 DECOMMISSIONING
SC 11 RECOMMISSIONING, COMMISSIONING AND COMPLETION OF INSTALLATIONS
SC 12 MEASUREMENT AND PAYMENT

SC 01 SCOPE

This specification encompasses all aspects of the repairs of systems and services that form part of an installation, including the factory and on-site testing, decommissioning, installation and commissioning of all equipment, instrumentation and materials reconditioned, supplied and installed as part of an installation as defined in Additional Specification SA: General Maintenance.

The specified procedures are the minimum requirements to be supplemented by various technical and particular specifications in this document. These requirements shall apply to all commissioning work scheduled as part of the initial repair work on installations, as well as commissioning work that is part of the routine preventive and corrective maintenance.

SC 02 PHASED REPAIRS AND UPGRADING OF THE INSTALLATION

When an installation consists of parallel systems or components, the complete installation and all its components shall be repaired without taking the complete installation out of commission at any time, unless otherwise specified in the Technical Specifications.

In order to schedule the repairs of an installation, all work shall be done in phases as specified in the Technical Specifications and illustrated in detail on the drawings. Repairs of each part shall terminate with the successful reconditioning of that part. Each part of the system shall be decommissioned and recommissioned in the sequence specified in the Technical Specifications and on the drawings.

The Contractor shall install all the necessary temporary specials, spool pieces, supporting frames and brackets to provide a functional link between each repaired and upgraded part of the system and the part of the installation that

has not yet been repaired and upgraded during recommissioning. Electrical and instrumentation Contractors and subcontractors shall ensure that the system remains operational as specified, using either existing or newly installed instruments, cables and controls.

Payment is based on the successful recommissioning of a specific part of the installation.

SC 03 DETAILED COMMISSIONING PROGRAMME

No work of any kind on any part of the existing installation shall take place prior to the Engineer's approval of a detailed commissioning programme. This programme shall be submitted in addition to the general programme for planning and monitoring contract progress, at least two weeks prior to any programmed shutdown. The programme shall be the coordinated product of the Engineer and the User Client. Commissioning programmes shall take all process requirements into account. The detailed commissioning programme shall indicate all actions necessary for:

(a) Decommissioning

(b) Recommissioning of parts of the installation

(c) Commissioning of the installation as a whole.

All work deemed necessary for practical completion of the installation shall be indicated on the commissioning programme.

The programme shall indicate the milestones to be achieved before shutdown and decommissioning as activities of zero duration, all of which shall be prerequisites linked to the "start" of decommissioning.

The following specific actions shall be included in the programme, clearly indicating the time allowed for:

(a) Communication, including the time for confirmation of the official shutdown;

(b) Draining parts of the installation to sumps, where available, or to other storage facilities provided by the Contractor;

(c) Installation of temporary blanked flanges or other means of isolation where necessary;

(d) Partial decommissioning and removal of existing material and equipment to perform work, including protection of pipework against hot work, cutting into pipework, loosening bolts, flanges and all other work necessary for recommissioning;

(e) Installation of temporary functional links (pipe specials) between any two parts of the installation;

(f) Each individual field weld, subject to the Engineer's approval;

(g) Non-destructive testing of materials, for manufacturing/construction quality and for producing test results;

(h) Installation of all instruments and their connection to SCADA systems;

(i) Installation and connection of all power cables;

(j) De-aeration of all pipe sections;

(k) Communication between the Contractor, the Engineer, the Employer and the User Client;

(l) Start-up of the complete system, indicating start-up procedures.

Inspection of the prefabricated installation, testing of all equipment prior to final commissioning, pressure testing and non-destructive testing shall be clearly scheduled in the project progress programme.

Day 30 tests and instruction/training sessions with the User Client shall be scheduled in the project progress programme.

SC 04 COMMISSIONING COMMUNICATION CHANNELS

The Contractor shall communicate with the User Client's operating and maintenance managers via the Engineer to finalise start-up after decommissioning in accordance with the specified procedures.

The following key parties shall be involved before and during shutdown and decommissioning of any part of the system:

Contractor:	Site Manager
Engineer:	Resident Engineer
Employer:	Project Manager
User Client:	Operation and Maintenance Manager.

SC 05 COMMISSIONING RISK CONTROL AND PENALTIES

(a) The safety instructions stipulated by the Occupational Health and Safety Act, 1993 (Act 85 of 1993) shall be adhered to at all times.

(b) The Contractor shall not be allowed to work on any part of the installation without obtaining a commissioning check permit on the day of shutdown. A typical example of a commissioning check permit is included in this document, referring to the minimum required milestones to be achieved prior to decommissioning.

(c) Payment reductions for exceeding the maximum permissible down-time during maintenance shall apply as stipulated in the General and special Conditions of Contract. This stipulation does not include shutdowns during programmed routine preventive maintenance work.

SC 06 DELAYS OF SCHEDULED SHUTDOWNS

Specific dates on which an installation shall be shut down for decommissioning shall be finalised during coordination meetings of all the parties involved, including the Engineer, the Employer, the User Client and the Contractor.

Although a date for each shutdown will be scheduled at the coordination meetings, the actual date of the shutdown shall be determined by the process requirements and user demands, allowing for a window of seven (7) calendar days from the date of the planned shutdown.

Prospective tenderers shall make allowances in their tendered rates for the shutdown to occur at any time during this seven-day period. No additional payment shall be due if the shutdown occurs within this seven-day period.

If the Contractor fails to commence with the shutdown and decommissioning of the installation within the scheduled period, all additional costs arising from the shutdown at a later stage shall be for the Contractor's account.

SC 07 MATERIAL AND EQUIPMENT PROCUREMENT AND PROTECTION

It is the responsibility of the Contractor to ensure the functionality of all units of new equipment prior to decommissioning, before installation of any specific part of the system. If the equipment, whether free-issued or not, does not conform to the functionality specifications during pre-installation testing, the Contractor shall notify the Engineer in writing without delay.

SC 08 TESTING OF EQUIPMENT PRIOR TO RECOMMISSIONING

The equipment shall be tested for functionality after pre-installation of equipment in parts of the installation.

(a) The Contractor shall inform the Engineer well in advance of his intention to perform the first tests and start-up of equipment in order to allow a representative of the Engineer to witness the tests. The extent of all precommissioning tests and checks shall be agreed with the Engineer prior to commencement.

(b) The Contractor shall first conduct his own tests of the equipment. When he is satisfied that the equipment complies with the specifications, he shall notify the Engineer that he is ready for the official tests on completion. The Contractor shall not conduct an official test without the Engineer's presence or approval. All equipment shall conform to the specified requirements.

(c) Before starting up any part of the installation or filling the 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 form 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 copies of the operating manuals have been handed to the Engineer.

(d) The Contractor shall start up each section of equipment after ensuring that oil fillings, lubrication, vibration monitoring, cable termination and so on have been correctly completed. He is also responsible for the first refilling of all lubricating oils and for adjusting the plant to operate according to the specifications. Before any equipment is started or energised, the Contractor shall ensure that it is safe in terms of the personnel and equipment on the site to do so. The Contractor's tendered rates and sums shall allow for these costs.

All equipment shall be tested according to the relevant specifications that form part of this document.

No shutdown or decommissioning of any part of the system shall take place unless all the equipment to be installed have been tested by the Contractor and approved by the Engineer.

SC 09 TESTING OF MATERIAL AND EQUIPMENT SPECIFICATIONS AND WORKMANSHIP

All results of the required non-destructive, precommissioning and manufacturing testing shall be submitted to the Engineer well in advance of testing the equipment on recommissioning. All such test results shall be submitted before Day 1 commissioning tests and no certificate of practical completion shall be issued prior to receipt of the required test results.

SC 10 DECOMMISSIONING

The decommissioning period shall commence on the instant of the entire system shutdown. The recommissioning period shall start in parallel with decommissioning.

Shutdown and decommissioning shall not proceed without compliance with all the milestones in the detailed commissioning programme. The list of milestones in this document is not complete but indicates the minimum requirements. Milestones to be achieved prior to shutdown and decommissioning may be added to the programme at the Engineer's discretion.

The Contractor is responsible for the safe decommissioning of all material, equipment, components and instrumentation to avoid damage to parts or components of the installation.

SC 11 RECOMMISSIONING, COMMISSIONING AND COMPLETION OF INSTALLATIONS

SC 11.01 RECOMMISSIONING

Recommissioning means the commissioning of all sections or systems that form part of the installation to meet the required functional specifications for the individual section or system prior to commissioning of the repaired and upgraded installation.

The Contractor is responsible for the recommissioning of all parts of the system and he shall perform the tasks listed below.

(a) Prior notice shall be given to and proper arrangements shall be made for recommissioning with the Employer, the Engineer, the User Client and the suppliers of equipment that is affected by recommissioning and testing.

(b) If plant and equipment supplied by others are to be commissioned, the supplier's specific permission together with all requirements related to commissioning shall be obtained prior to recommissioning without in any way altering the Special Conditions of Contract with reference to the Contractor's liability in terms of defects.

(c) The new and reconditioned parts of the installation shall be thoroughly inspected by a responsible representative of the Contractor to ensure that manufacture/construction and installation work have been completed according to the specifications.

SC 11.02 **COMMISSIONING AND COMPLETION OF REPAIRS AND UPGRADING WORK**

Commissioning means commissioning of the repaired and upgraded installation as a whole to perform in perfect working order.

(a) The commissioning period for each installation as a whole:

(i) Commences with the Day 1 tests of the complete repaired and upgraded installation;

(ii) Includes commissioning of all sections and systems that have been recommissioned prior to the Day 1 tests;

(iii) Includes training of the User Client's operating personnel and the maintenance teams;

(iv) Terminates with a Day 30 test in compliance with the commissioning report.

(b) The purpose of the Day 1 tests is to ensure that:

(i) The electronic, electrical and mechanical equipment and materials are functional and in perfect working order with respect to each other and the installation as a whole;

(ii) The commissioning period, including training, commences on successful completion of the Day 1 tests;

(iii) The Contractor is entitled to a certificate of practical completion for the repairs and upgrading of the installation on successful completion of the Day 1 tests;

(iv) The Contractor becomes responsible for maintenance of the installation and is entitled to performance-based payments in compliance with the Special Conditions of Contract and Additional Specification SA: General Maintenance.

(c) Commissioning shall be undertaken over a trouble-free period up to Day 30. During this period the Contractor shall train the User Client's operators and his maintenance team for operating and maintaining the installation. This training shall allow for all possible operational conditions, including emergency conditions, the correct servicing of every part, the type of oil or grease to be used, and similar tasks. The training shall take place by means of demonstrations, and the operating and maintenance manuals shall be referred to for this purpose.

(d) Day 30 commissioning tests shall be performed thirty calendar days after the successful completion of the Day 1 tests. The commissioning period of the installation terminates upon the successful completion of the Day 30 tests.

(e) The Contractor shall conduct all the tests required to satisfy the Engineer that the installation is performing according to specification, and shall make allowance for these tests in his tendered rates and prices. These tests shall be conducted to certify that the installation, as repaired, upgraded and installed, is in perfect working order in terms of the specified functional requirements. The Contractor shall note that all equipment is to be tested as part of an installation, where appropriate, and will not be

passed if all protection devices, interlocking with other equipment, etc, are not fully functional.

(f) The Engineer shall provide commissioning sheets to the Contractor at least three weeks before the commissioning period commences, for all the equipment supplied, reconditioned and installed by the Contractor. The Contractor shall complete the commissioning sheets during the commissioning period and all items listed shall be entered. No completion certificate will be issued for an installation of which the equipment has incomplete commissioning reports. Information that is not available or applicable, or instances where certain tests have not been carried out, are subject to the Engineer's decision.

(g) Commissioning of the plant (which includes the thirty days between the Day 1 and Day 30 tests) includes operating under conditions that adequately prove that all the specifications have been met. All safety devices, standby 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 the equipment is suspected to be substandard. Costs related to such tests shall be for the Contractor's account and shall comply with the specified requirements. Copies of updated commissioning reports shall be provided to the Engineer within two days after a test has been performed.

(h) The Contractor is responsible for providing all labour and materials (including testing equipment) during the commissioning period and shall carry out all the servicing and adjustments to ensure that the installation operates as specified. Valid calibration certificates shall be available for all testing equipment on the site during the commissioning period.

(i) Programmes for the Day 1 tests, Day 30 tests and instruction/training sessions with the User Client's operators and maintenance team shall be prepared by the Contractor and submitted to the Engineer at least two weeks before the commissioning period commences. The Contractor shall provide weekly updates of these schedules for the duration of the commissioning period.

(j) The Contractor shall note that if any equipment fails during the commissioning period, the equipment shall be repaired or replaced by the Contractor, and testing and commissioning shall commence from scratch.

(k) Successful commissioning of an installation entitles the Contractor to a certificate of completion for the installation.

SC 12 MEASUREMENT AND PAYMENT

SC 12.01 **Decommissioning and removing parts of the installation** .....Unit: sum

The unit of measurement shall be a sum.

The tendered sum shall include full compensation for all actions and labour required for shutdown and decommissioning of the entire installation as specified to enable decommissioning and removal of parts of the installation as listed in the Schedule of Quantities.

The tendered sum shall include full compensation for the decommissioning and removal of the parts and components of an installation as listed individually in the Schedule of Quantities, including actions and/or costs resulting from such

work, to enable the recommissioning of parts of the repaired and/or upgraded installation.

The tendered sum shall include full compensation for final dismantling of decommissioned materials and equipment and the removal of all such items to stores on site, as directed by the Engineer.

SC 12.02 **Commissioning and testing of parts of the installation** .....Unit: sum

The unit of measurement shall be a sum.

The tendered sum shall include full compensation for commissioning and testing parts of the installation to be operational while still incomplete in relation to the entire repaired and/or upgraded system or installation.

Separate payment items shall be scheduled for separate parts of the system.

SC 12.03 **Commissioning and testing of the installation** .....Unit: sum

The unit of measurement shall be a sum.

The tendered sum shall include full compensation for commissioning the upgraded installation as a whole and for all costs and expenses related to labour, removal, repair, reinstallation and testing of material and equipment during the commissioning period for each part of the installation. The tendered sum shall include full compensation for the final commissioning and testing, including Day 1 and Day 30 tests, of all parts and components of the installation to the specified functional condition.

Payment shall be based on successful completion of the Day 30 tests.

SC 12.04 **Provision for safety and hot work requirements during shutdown** ..... Unit: number

The unit of measurement shall be the number of shutdowns during which all the required safety and hot work requirements are provided.

The tendered rates shall include full compensation for all the required safety and hot work requirements and arrangements in accordance with the specifications during a shutdown period, including all labour, personnel, equipment, materials and consumables required.

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SI 1 DEFINITIONS

In this document the following expressions shall bear the meanings assigned to them below:

Agent

Means a competent person who acts as a representative for a Client;

Client

Means any person for whom construction work is being performed (***i.e. Zebediela Police Station/ South African Police Service***) for purposes of this specification;

COID ACT

Means the Compensation of Occupational Injuries and Diseases Act and Regulations, Act 130/1993

Construction Regulations

Means the Occupational Health and Safety Act's, No 85 of 1993, R 84 of February 7, 2014 Construction Regulations that came into effect on February 7, 2014;

Occupational Health and Safety Plan

Means a documented plan, which addresses hazards identified and includes safe working procedures to mitigate, reduce or control the hazards identified;

Occupational Health and Safety specification

Means a documented specification of all Health and Safety requirements pertaining to the associated works on a construction site, so as to ensure the Health and Safety of persons working, visiting, passing, staying and/or working close to the site;

OHS ACT

Means the Occupational Health and Safety Act and Regulations, Act 85 of 1993, as amended;

Principal Contractor

Means an Employer, as defined in Section 1 of the OHS Act, who performs construction work and is appointed by the Client to be in overall control and management of the construction site and works.

SI 2 INTRODUCTION

In terms of Construction Regulation 5(1)(b) of the OHS Act, the Client is required to compile an Occupational Health and Safety Specification for any intended project and provide such specification to prospective tenderers.

This specification has as objective to ensure that the Principle Contractor entering into a contract with the Client achieves and maintains an acceptable level of Occupational Health and Safety performance and compliance. This document forms an integral part of the contract between the Client and the Principal Contractor and the Principal- and other contractors should make it part of any contract/s that they may have with other contractors and/or suppliers as far as this project is concerned.

Compliance with this document does not absolve the Principal Contractor from complying with any other minimum legal requirements and the Principal Contractor remains responsible for the Health and Safety of his employees, those of his mandataries as well as any persons on adjacent properties as far as it relates to the construction activities.

Standing time claims related to any health & safety matter will not be entertained.

SI 3 SCOPE

To develop a project specific Occupational Health and Safety specification that addresses the reasonable and foreseeable risks, exposures and aspects of Occupational Health and Safety as affected by the abovementioned contract work.

The specification will provide the requirements that the Principal Contractor and other contractors will have to comply with in order to reduce the risks associated with the abovementioned contract work and that may lead to incidents causing injury and/or ill health, to a level as low as reasonably practicable and possible.

A contractor appointed as the Principal Contractor response to the Client's formal tender for the construction project, has to prepare an Occupational Health and Safety Plan based on his specification. The Client will evaluate this plan to ensure compliance with Construction Regulation 5(1)(h) that stipulates that the Client may only appoint a contractor who has the necessary competencies and resources to carry out this work safely.

The following repair work is included at the Lowveld Botanical Gardens. The items allowed for in the scope of works will only be executed upon instruction from the Engineer when so required and when necessary.

Glass House

Civil, Structural and Building Works

- Glass House overhead netting structure that is currently damaged to be repaired. The net that was found torn will be replaced.
- Rubber seals not sealing glass house properly will be replaced.
- Glass House glasses previously stained to cleaned and de-stained.
- Glass House glasses out of position to be fixed.
- Glasses cracked and broken to be replaced.
- Trees affecting glass house to be trimmed.
- Glass House frame nuts that are rusted to be replaced.
- Pores seen on concrete to be sealed.
- Concrete floors that are cracked to be repaired.
- Glass House doors to be fixed to ensure that the doors close properly, glasses on doors are replaced; new handles fitted, and lock mechanism replaced to a working condition.
- Sump covers to be fitted and secured properly to ensure a complete seal.

- Glass House floors to be cleaned to remove algae, levelled, cracks repaired, and correct slopes to be instituted.
- Plant beds concrete damage to be repaired.

Mechanical Installations

- Irrigation piping which are rusted and leaking to be replaced. Solenoids for controlling irrigation to be replaced and optimised.
- Irrigation system that led to water ingress in luminaires to be revamped. Sprinklers to be installed where missing.
- Old irrigation piping that is rusted and blocked outside of the glass house to be removed.
- Irrigation piping arrangement from outside to inside of Glass House to be revised.
- Leak at piping at the inlet of the irrigation booster pump, situated outside the Glass House, to be repaired.
- The dysfunctional irrigation booster pump situated outside the Glass House must be replaced.
- Evaporative cooling pad frame that had excessive rust must be replaced when new evaporative cooling pads or alternative mist system is installed.
- Sheeting installed at place of evaporative cooling pads to be removed. New structure to be fitted at part of installing new evaporative cooling pads or alternative mist system.
- New evaporative cooling pads or alternative mist system and air inlet louvres for winter seasons to be installed.
- Plant beds to be fitted with new soil heaters complete with temperature sensors and controllers.
- Instrumentation and wiring that were removed or incomplete for sump pump to be reinstated.
- Sump that was overflowing to be fitted with level probes and an overflow pipe to irrigate surrounding grass to be installed.
- Sump piping that is dysfunctional must be replaced when new evaporative cooling pads are installed.
- Fan motors that are excessively rusted and don’t function will be replaced when new fan assemblies.
- Fans that are dysfunctional with old motors, pulleys taken out, and frames and fan blades rusted must be replaced.
- Fan machine guards that were previously disassembled to be reinstated as part of fitting new fan assemblies.
- Glass House fan louvres surface rust seen to be removed.

Electrical Installations

- Old Glass House electrical panel to be replaced with modern and optimised panel.
- Electrical wiring and conducts that was seen rusted, damaged, and unsafe inside the Glass House will be replaced.
- Glass House lamination/ luminaires filled with water is unsafe and will be replaced with waterproof (IP65) light fittings.
- Electrical cables and e-stops related to fans to be replaced to ensure the safe operation of mechanical and electrical installations.

Germination House

Civil, Structural and Building Works

- The Germination House roof sheeting must be replaced including trusses and purlins which are broken or previously nailed to the old roof sheeting.
- Concrete around Germination House that previously collapsed must be repaired.

Mechanical Installations

- Valves at the Germination House must be repaired, serviced, and returned to operation where possible. Otherwise, new valves must be installed where repairs and serving is not possible.
- Germination House piping to be replaced where rusted.
- Solenoid valve, pressure gauge and filters to be replaced.
- Soil heaters that were dysfunctional and not working will be replaced.
- Soil heater isolator, controls and temperature regulator that do not work must be replaced.
- A new irrigation booster pump complete with securing brackets will be installed near the Mist House.

Electrical Installations

- Soil heater conduits that are rusted, and enclosing unsafe wiring will be replace complete with new cables.
- Cables going to soil heater isolators, controls and temperature regulators must be repair or replaced, depending on their condition.

Mist House

Civil, Structural and Building Works

Although the Mist House will not be the first priority in terms of repairing infrastructure during the project, the following should be implemented, if the budget permits:

- The damaged and not fit for purpose roof sheeting must be replaced at the Mist House.
- After the refurbishment of the Mist House, appropriate housekeeping will be conducted by the contractor.
- Concrete cracked inside the Mist House to be repaired.

Mechanical Installations

- Mist House water controls and filters to be reinstated.
- Mist House soil heaters, controls, and temperature regulators will be replaced.
- Mist House pipes that are currently rusted will be replaced. Where possible, alternative piping materials which are corrosion resistant will be utilised.

Electrical Installations

- Mist House electricity panels that are not safe, rusted and filled with wasps to be upgraded and modernised.
- Mist House panel controls that not functional to be replaced. This will include cables and conduits to and from soil heaters.

The description of the Works given above is not necessarily complete and shall not limit the work to be carried out by the Contractor under this Contract. All work will be performed according to the relevant specifications forming part of this Contract.

SI 4 GENERAL OCCUPATIONAL HEALTH AND SAFETY PROVISIONS

SI 4.1 Hazard Identification and Risk Assessment

SI 4.1.1 Risk assessments

This specification contains a list of risk assessment headings that have been identified by the Client as possibly applicable to the abovementioned contract work. It is, by no means, exhaustive and is only offered as assistance to the contractors intending to tender for the applicable works.
List of Risk Assessments to be used on site:

- Aggregate/Sand Delivery
- Brickwork
- Crane Operations
- Cutting of pipes
- Demolition Work
- Distribution boards – Electrical
- Drivers – of vehicles

Electrical installation and Maintenance

- Electrical Welding Machines
- Fire prevention and protection
- Gas welding-cutting operations
- Generators
- Grinding Machines Operation
- Hand and spray painting
- Hand Excavation
- Hand tools
- Installation of Glass
- Laying of pipes
- Levelling – off materials
- Loading supervisor
- Loading/unloading – of trucks
- Machine operator
- Material delivery
- Material handling
- Plastering
- Portable Electrical Tools
- Portable ladders
- Scaffolding
- Site establishment
- Skill Saw
- Tile stacking

- Tiling
- Traffic control
- Trenches – Digging of
- Use of portable electrical tools
- Work in elevated positions
- Working close to existing services i.e. electrical, waste water etc
- Working close to traffic
- Workshops
- Working at/on open edges
- Working at a Wastewater and Water Treatment Works with associated hazards.

SI 4.1.2 Development of Risk Assessments

Every Principal Contractor performing construction work shall, before the commencement of any construction work or work associated with the aforesaid construction work and during such work, ensure that risk assessments are undertaken by a competent person, appointed full time on site in writing, including proof of training, and the risk assessments shall form part of the Occupational Health and Safety plan and be implemented and maintained.

The risk assessments shall include, at least:

- The identification of the current as well as emerging risks and hazards to which persons may be exposed to
- The analysis and evaluation of the risks and hazards identified
- A documented plan of safe working procedures (*SWP*) and any method statements to mitigate, reduce or control the risks and hazards that have been identified
- A plan to monitor the application of the SWP's; and
- A plan to review the risk assessments as the work progresses and changes are introduced.
- A Plan Task Observation (*PTO*) must be done on a weekly basis on all risk assessments and the record of it must be in the safety file.

Based on the risk assessments, the Principal Contractor must develop a set of site-specific Occupational Health and Safety rules that will be applied to regulate the Occupational Health and Safety aspects of the construction.

The risk assessments, together with the site-specific Occupational Health and Safety rules, must be submitted to the **Client before** mobilization on site commences.

Despite the risk assessments listed, the Principal Contractor is required to conduct a baseline risk assessment and the aforesaid risk assessments must be incorporated into the baseline risk assessment. The baseline risk assessment must further include the SWP's and the applicable method statements based on the risk assessments.

Hazard identification and risk assessments must be undertaken whilst SWP's must be developed for all out-of-scope work.

SI 4.1.3 Review of Risk Assessments

The Principal Contractor is to review the hazards identified, the risk assessments and the SWP's at each production planning and progress report meeting as the contract work develops and progresses and each time changes are made to the designs, plans and construction methods and/or processes.

The Principal Contractor must provide the Client, other contractors and all other concerned or affected parties with copies of any changes, alterations or amendments as soon as possible but within 14 days of such changes.

SI 4.2 LEGAL REQUIREMENTS

All Contractors entering into a contract with the Client shall, as a minimum, comply with the –

- OHS Act and a current, up-to-date copy of the OHS Act and its Regulations must be available on site at all times
- Compensation for Occupational Injuries and Diseases Act, No 130 of 1993 (*COID Act*). The Principal Contractor will be required to submit a letter of registration and "good-standing" from the Compensation Commissioner or compensation insurer before being awarded the contract. A current, up-to-date copy of the COID Act must be available on site at all times; and
- Where work is being carried out on mine premises, as well as where any tunneling will be done, the contractor will comply with the Mine Health and Safety Act and Regulations (*Act. 29 of 1996*), the Minerals Act and Regulations (*Act 50 of 1991*) and any other Occupational Health and Safety requirements that the mine may specify. Current, up-to-date copies of the last two mentioned Acts must be available on site at all times.

SI 4.3 STRUCTURE AND RESPONSIBILITIES

SI 4.3.1 Overall Supervision and Responsibility for Occupational Health and Safety

The Principal Contractor is responsible to implement and maintain the Occupational Health and Safety Plan approved by the Client.

The Chief Executive Officer (*in terms of Section 16(1) of the OHS Act*) of the Principal Contractor is to ensure that the Employer (*as defined in the OHS Act*) complies with the OHS Act. "*Legal Compliance Checklist*" may be used for this purpose.

The Principal Contractor's Chief Executive Officer may appoint any person reporting to him/her as Designated Person in terms of Section 16(2) of the OHS Act. Such Designated Person is responsible to assist the Chief Executive Officer to ensure that the Employer complies with the requirements of the OHS Act.

The construction supervisor(s) appointed are responsible for supervising the construction work and in specific to ensure that all work undertaken comply with the requirements of the OHS Act, its Regulations and the Client's specifications.

SI 4.3.2 Operational responsibilities for Occupational Health and Safety

The Principal Contractor shall appoint designated competent employees and/or other competent persons as outlined in the following list to assist with the operational responsibilities for Occupational Health and Safety (*this list is only the minimum requirement and is therefore in no way exhaustive*):

Appointment description	Appointment required in terms of
Accident/ Incident Investigator	General Safety Regulation 9(2)
Assistant Construction Manager	Construction Regulation 8(2)
Assistant Construction Work Supervisor	Construction Regulation 8(8)
Construction Manager	Construction Regulation 8(1)
Construction Supervisor	Construction Regulation 8(7)
Construction vehicle, mobile plant and machinery supervisor / operators	Construction Regulation 23
Demolition Supervisor	Construction Regulation 14(1)
Drivers of construction vehicles and operators or plant	Construction Regulation 23
Emergency/ Fire Co-ordinator	Construction Regulation 29
Excavation Supervisor	Construction Regulation 13(1)(a)
Explosive powered tool Controller	Construction Regulation 21(g)(i)
Explosive powered tool Operator	Construction Regulation 21(1)(b)
Fall Protection Planner	Construction Regulation 10(1)(a)
First-aiders	General Safety Regulation 3
Temp Works/ Form & Support Work Inspector	Construction Regulation 12(3)(f)
Temp Works/ Form & Support Work Supervisor	Construction Regulation 12(2)
H&S Safety Representative	Section 17 of the OHS Act

Appointment description	Appointment required in terms of
Lifting machines and equipment inspector / Operators	Construction Regulation 22
Risk Assessor	Construction Regulation 9(1)
Safety Officer / Consultant	Construction Regulation 8(5)
Scaffolding Erector	Construction Regulation 16
Scaffolding Inspector	Construction Regulation 16
Scaffolding Supervisor	Construction Regulation 16

These appointments must be in writing and the responsibilities clearly stated together with the period for which each appointment is made. This information must be communicated to and agreed with the appointees. Appointments should also include proof of training where applicable.

Register by a statutory body SACPCMP *(with effect 6 August 2015)*.

Copies of appointments must be submitted to the Client together with short concise CV's of the appointees as part of the Principal Contractor's Health and Safety plan and if appointed copies of the appointments included in the Occupational Health and Safety file. All appointments must be approved by the Client and any changes in appointees or appointments must be communicated to the Client and agreed upon before being implemented.

The Principal Contractor must, furthermore provide the Client with an organogram of all contractors that he/she has appointed or intends to appoint and keep this list updated on a weekly basis.

SI 4.3.3 Designation of Occupational Health and Safety Representatives

Where the Principal Contractor employs more than 20 persons [*including the employees of other contractors (sub-contractors)*] he has to appoint one Occupational Health and Safety representative

for every 50 employees or part thereof. General Administrative Regulation 6 requires that the election, appointment and subsequent designation of the Occupational Health and Safety representatives be executed in consultation with employee representatives or employees.

Occupational Health and Safety representatives have to be designated in writing and the designation must include the area of responsibility of the person and term of the designation.

Should the appointed representatives require any training, assistance or facilities, the Principal Contractor must provide these.

SI 4.3.4 Duties and Functions of the Occupational Health and Safety Representatives

The Principal Contractor must ensure that the designated Occupational Health and Safety representatives conduct a weekly inspection of their respective areas of responsibility, using a checklist, and report thereon to the Principal Contractor.

Occupational Health and Safety representatives must be included in accident and/or incident investigations.

Occupational Health and Safety representatives must attend all Occupational Health and Safety committee meetings.

SI 4.3.5 Appointment of Occupational Health and Safety Committee

The Principal Contractor must establish an Occupational Health and Safety committee consisting of all the designated Occupational Health and Safety representatives together with a number of management representatives that are not allowed to exceed the number of Occupational Health and Safety representatives on the committee and a representative of the Client who shall act as a co-opt without voting rights. The members of the Occupational Health and Safety committee must be appointed in writing and copies of the appointments included in the Occupational Health and Safety file.

The Occupational Health and Safety committee must meet as a minimum on a **monthly** basis and consider, at least, the following agenda items:

- Opening and welcome
- Members present, apologies and absent
- Minutes of previous meeting
- Matters arising from the previous meeting
- Occupational Health and Safety representatives' reports
- Incident and/or accident reports and investigations
- Incident, accident and/or injury statistics
- Other matters
- Endorsement of registers and other statutory documents by a duly authorised representative of the Principal Contractor
- Close and next meeting.

SI 4.4 MANDATARIES & CONTRACTORS SAFETY FILE

It is a requirement that the Principal Contractor, when he appoints Contractors, includes an OHS Act Section 37(2) agreement (*i.e. Agreement with Mandatary*) in his agreement with such Contractor.

SI 4.5 ADMINISTRATIVE CONTROLS AND THE OCCUPATIONAL HEALTH AND SAFETY FILE

SI 4.5.1 The Occupational Health and Safety File

As required by Construction Regulation 7(2)(b), the Principal Contractor and other Contractors will each keep a completed and updated Occupational Health and Safety File on site, containing the following documents as a minimum:

- Notification of construction work
- Updated copy of the OHS ACT and its Regulations (*General Administrative Regulation 4)*
- Proof of registration and good standing with the Compensation Commissioner or a COID Insurer
- Occupational Health and Safety plan agreed with the Client including the underpinning risk assessment(s) and method statements
- Copies of Occupational Health and Safety committee meetings and other relevant minutes.
- Designs and/or drawings
- A list of Contractors (*Sub-Contractors*) including copies of the agreements between the parties and the type of work being done by each Contractor

- Appointment and designation forms in the safety file
- The following registers:

    - Accident and/or incident register (*Annexure 1 of the General Administrative Regulations*)
    - Occupational Health and Safety representatives inspection register
    - Construction vehicles and mobile plant inspections by controller
    - Daily inspections of vehicles, plant and other equipment by the operator, driver and/or user
    - Designer's inspections and structures record
    - Inspection and maintenance of explosive powered tools
    - Inspection of electrical installations (including inspection of portable electrical tools, electrical equipment and other electrical appliances)
    - Fall protection inspections
    - First-aid box content
    - Record of first-aid treatment
    - Fire equipment inspections and maintenance
    - Record of hazardous chemical substances kept and used on site
    - Ladder inspections
    - Machine safety inspections (*including machine guards, lock-outs etcetera*);
    - Inspection registers and logbooks for lifting machines and – tackle *(including daily inspections by drivers/operators*)
    - Inspection of scaffolding
    - Inspection of stacking and storage
    - Inspections of structures
    - Pressure Equipment inspections; and
    - Inspection of welding equipment.

- All other applicable record.

The Client will conduct an evaluation of the Principal Contractor's Occupational Health and Safety file from time to time during a month, but at least once a month.

The Principal Contractor will conduct an evaluation of the Contractor's Occupational Health and Safety file from time to time during a month, but at least once a month.

Each Contractor must keep his/her Health and Safety File updated for the Principal Contractor, on a weekly basis. The Subcontractor will agree to comply with the terms of the Provisions of Section 37(2) of the Occupational & Safety Act, Act No. 85 of 1993 together with the Construction Regulations 2014 as amended.

Furthermore the sub ccontractor is to indemnify the Employer against any claims in this regard.

SI 4.5.2 Non-conformance to any Health and Safety requirements

The Employer's Safety Consultant (Employer's Agent in terms of the Contract Data) has the right to impose penalties for non-conformance to <u>any</u> safety requirements in terms of the Act and Regulations and the safety specification / plan.

A first and only written warning will be issued by the Safety Consultant (*and ratified by the Principal Agent*) to the Principal Contractor in the event of any non-conformance, by means of a contract instruction (*in terms of the Principal Building Agreement*). Immediate compliance **(*within 1 (one) calendar day*)** should be achieved after a written warning has been issued, to the full satisfaction of the Safety Consultant and or Safety Representative of the Principal Contractor, failing which a penalty will be imposed on the Principal Contractor.
This penalty will be recovered through a recovery statement and will be equal to an amount calculated at a rate of **R 3,000-00** per calendar day for each and every calendar day of default in terms of the Act and Regulations, safety specification and or safety plan.

The Principal Contractor will recover this penalty in full from the defaulting Sub-Contractor through the N/S recovery statement issued in terms of their Subcontract Agreement.

SI 4.6 OCCUPATIONAL HEALTH AND SAFETY GOALS AND OBJECTIVES AND ARRANGEMENTS FOR MONITORING AND REVIEW OF OCCUPATIONAL HEALTH AND SAFETY PERFORMANCE

The Principal Contractor is required to maintain a casualty incident frequency rate (CIFR) of at least 4 to this document: “Measuring Injury Experience” and report on this to the Client on a monthly basis.

SI 4.7 NOTIFICATION OF CONSTRUCTION WORK

The Principal Contractor must, where the contract meets the requirements laid down in Construction Regulation 4, within 7 days before the work is to be carried out, notify the Department of Labour of the intention to carry out construction work and use the form (*Annexure A in the Construction Regulations*) for this purpose. A copy of the notification must be held on the Occupational Health and Safety file and a copy must also be forwarded to the Client for record purposes.

SI 4.8 TRAINING, AWARENESS AND COMPETENCE

The contents and syllabi of all training required by the OHS Act and Regulations must be included in the Principal Contractor’s Occupational Health and Safety plan.

SI 4.8.1 General Induction Training

All members of the Contractor’s site management as well as all the persons appointed as responsible for Occupational Health and Safety in terms of the Construction and other Regulations will be required to attend a general induction session.

All employees of the principal and other Contractors must be in possession of proof of general induction training.

SI 4.8.2 Site-specific Induction Training

The Principal Contractor will be required to develop a contract work project specific induction training course based on the risk assessments for the contract work and train all employees and other Contractors and their employees in this.

All employees of the Principal and other Contractors must be in possession of proof that they have attended a site-specific Occupational Health and Safety induction training at all times.

SI 4.8.3 Other Training

All operators, drivers and users of construction vehicles, mobile plant and other equipment must be in possession of valid proof of training and where applicable licenses for this applicable construction vehicles & mobile plant.

All employees in jobs requiring training in terms of the OHS Act and Regulations must be in possession of valid proof of training.

Occupational Health and Safety training requirements [*as required by the Construction Regulations and as indicated by the Occupational Health and Safety Specification and the risk assessment(s)*] i.e.:

- General induction *(Section 8 of the OHS Act)*
- Site and job specific induction, including visitors *(Sections 8 and 9 of the Act)*
- Site and project manager
- Construction supervisor
- Occupational Health and Safety representatives *(Section 18 (3) of the Act)*
- Training of the appointees indicated in paragraphs 4.3.1 and 4.3.2 above
- Operators and drivers of construction vehicles and mobile plant (*Construction Regulation 23*)
- Basic fire prevention and protection *(Environmental Regulations 9 and Construction Regulation 29)*
- Basic first-aid *(General Safety Regulations 3)*
- Storekeeping methods and safe stacking *(Construction Regulation 28)*; and
- Emergency, security and fire coordinator.

SI 4.8.4 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 (*Weekly*)
- Posters
- Videos
- Competitions
- Suggestion schemes
- Participative activities such as employee "*Occupational Health and Safety circles*".

SI 4.8.5 Notices and Signs

The following notices and signs are, where applicable, compulsory on the construction site as well as the Contractors' yards:

Area and/or activity where notice or sign is required	Notice or sign required in terms of
Display of notices and signs	General Safety Regulation 2B and SABS Code 1186
Entry	General Safety Regulation 2C(2)
First-aid	General Safety Regulation 3(6)
Toilets and change rooms	Facilities Regulation 2(5); 4(2)(f)
Storage of flammable materials	General Safety Regulation 4(8)(a)(i) and (ii) *(10(e) only applicable to Contractor's yards)*
Grinding wheels	Driven Machinery Regulation 8(1)(7)
Machinery	General Machinery Regulation 9 *(Schedule D)*
Explosive powered tools	Construction Regulation 21(2)(f)
Prohibition on smoking and eating or drinking at the workplaces where high risk substances [*FR5 (1)*] are stored or handled	Facilities Regulation 6(b)
Non-potable water	Facilities Regulation 7(b)

SI 4.8.6 Competence

The Principal Contractor shall ensure that his and other Contractors' employees appointed are competent and that all training required doing the work safely and without risk to health of their or other persons, has been successfully completed before work commences.

The Principal Contractor shall ensure that follow-up and refresher training is conducted on a regular basis as well as the contract work progresses and the work situation changes.

Records of all training must be kept on the Occupational Health and Safety file for auditing purposes.

SI 4.9 CONSULTATION, COMMUNICATION AND LIAISON

The following arrangements will apply:

Occupational Health and Safety liaison between the Client, the Principal Contractor, the other Contractors, the designer and other concerned parties will be through the Occupational Health and Safety committee. In the absence of a Health and Safety committee, the Client and Principal Contractor will agree on an alternative communication forum to be implemented.

In addition to the above, communication may be directly to the Client or his appointed Agent, verbally (*followed up in writing within 14 days*) or in writing, as and when the need arises.

Consultation with the workforce on Occupational Health and Safety matters will be through their supervisors, Occupational Health and Safety representatives, the Occupational Health and Safety committee and their elected trade union representatives, if any.

The Principal Contractor will be responsible for the dissemination of all relevant Occupational Health and Safety information to the other Contractors, for example design changes agreed with the Client and the designer, instructions by the Client and/or his agent, exchange of information between Contractors, the reporting of hazardous and/or dangerous conditions and/or situations etc.

The Principal Contractor will be required to do site safety walks with the Client and/or his Agent on a basis to be determined and agreed between the parties.

The Principal and other Contractors will be required to conduct toolbox talks with their employees on a weekly basis and records of these must be kept on the Occupational Health and Safety file. Employees must acknowledge the receipt of toolbox talks which record must, likewise be kept on the Occupational Health and Safety file. Toolbox talk topics must include applicable health and safety issues.

The Principal Contractor's most senior manager on site will be required to attend all the Client's Occupational Health and Safety meetings.

The Client or his Agent and the Principal Contractor will agree of the dates, times and venues of the Occupational Health and Safety meetings.

SI 4.10 CHECKING, REPORTING AND CORRECTIVE ACTIONS

SI 4.10.1 Monthly compliance assessment by Client

The Client will be conducting a monthly assessment to comply with Construction Regulation 5(1)(*o*) and to confirm that the Principal Contractor has implemented and is maintaining the agreed and approved Occupational Health and Safety plan.

SI 4.10.2 Other assessments and inspections by the Client

The Client reserves the right to conduct other ad-hoc assessments and inspections as deemed necessary. This could include among others site safety walks and Sub Contractor safety file audits.

SI 4.10.3 Conducting an assessment

A representative of the Principal Contractor must accompany the Client on all assessments and inspections and may conduct his/her own inspection at the same time. Each party will, however, take responsibility for the results of his/her own assessment and/or inspection.

SI 4.10.4 Contractor's assessments and inspections

The Principal Contractor is to conduct his own internal assessments and inspections to verify compliance with his own Occupational Health and Safety plan and management system as well as the requirements of this specification and the compliance of other Contractors under his/her control. These assessments and inspections must include an audit on documentation no less than once every month.

SI 4.10.5 Inspections by Occupational Health and Safety representatives and other appointees

Occupational Health and Safety representatives must conduct weekly inspections of their areas of responsibility and report thereon to their foreman or supervisor whilst other appointees must conduct inspections and report thereon as specified in their appointments for example vehicle, plant and machinery drivers, operators and users must conduct daily inspections before start-up.

SI 4.10.6 Recording and review of inspection results

All the results of the abovementioned inspections must be in writing, reviewed at Occupational Health and Safety committee meetings, endorsed by the chairperson of the meeting and placed on the Occupational Health and Safety file.

SI 4.10.7 Reporting of Inspection results

The Principal Contractor is required to provide the Client Health and Safety Consultant with monthly reports and inspections.

SI 4.11 INCIDENT REPORTING AND INVESTIGATION

SI 4.11.1 Reporting of Accidents and Incidents

The Principal Contractor must report all incidents where an employee is injured on duty to the extent that he/she:

- dies
- becomes unconscious
- loses a limb or part of a limb
- is injured or becomes ill to such a degree that he/she 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/she 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 the Client within two days and to the Provincial Director of the Department of Labour within seven days from date of incident (*Section 24 of the OHS ACT and General Administrative Regulation 8*), **except** that, where a person has died, has become unconscious for any reason or has lost a limb or part of a limb or may die or suffer a permanent physical defect, the incident must be reported to both the Client and the Provincial Director of the Department of Labour forthwith by telephone, telefax or e-mail. All other reports should still be completed and provided as required.

The Principal Contractor is required to provide the Client with copies of all statutory reports required in terms of the OHS ACT within 7 days of the incident occurring.

The Principal Contractor is required to provide the Client with copies of all internal and external accident/incident investigation reports, including the reports contemplated in 4.11.2 below, within 7 days of the incident occurring.

SI 4.11.2 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 he, she and/or they had to be referred for medical treatment by a doctor, hospital or clinic.

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 minor and non-injury incidents as described in Section 24(1)(b) and (c) of the OHS Act and keeping a record of the results of such 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 keeping a record of the results of such investigations including the steps taken to prevent similar accidents in future.

The Client reserves the right to hold its own investigation into an incident or call for an independent external investigation.

SI 5 OPERATIONAL CONTROL

SI 5.1 EMERGENCY PREPAREDNESS, CONTINGENCY PLANNING AND RESPONSE

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/she must then develop detailed contingency plans and emergency procedures, taking into account any emergency plan that the Client may have in place.

The Principal Contractor and the other Contractors must hold regular practice drills of contingency plans and emergency procedures to test them and familiarize employees with them.

SI 5.2 FIRST-AID

The Principal Contractor must provide first-aid equipment (including a stretcher) and have qualified first-aider(s) on site as required by General Safety Regulation 3 of the OHS Act.

The contingency plan of the Principal Contractor must include arrangements for the speedily and timeously transportation of injured and/or ill person(s) to a medical facility or of getting emergency medical aid to person(s) that may require it.

The Principal Contractor must have firm arrangements with his other Contractors in place regarding the responsibility of the other Contractors injured and/or ill employees.

SI 5.3 MEDICAL CERTIFICATE

A Contractor must 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** of the Construction Regulations 2014.

SI 5.4 SECURITY

The Principal Contractor must establish site access rules and implement and maintain these throughout the construction period.

Access control must be controlled and handled by a security company that is registered by SIRA and the rule that non-employees will not be allowed on site unaccompanied.

The Principal Contractor must develop a set of project applicable security rules and procedures and maintain these throughout the construction period.

SI 5.5 FALL PROTECTION PLAN (WORKING IN A FALL RISK POSITION)

A pre-emptive risk assessment will be required for any work to be carried out above (2) two metres from the ground or any floor level and will be classified as "*work in elevated positions*".

As far as is practicable, any person working in an elevated position will work from a stable platform, ladder or other device that is at least as safe as if he or she is working at ground level and whilst working in this position be wearing a single belt with lanyard to prevent the person falling from the platform, ladder or other device utilized. 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 SANS 10085 code of practice for the design, erection, use and inspection of access scaffolding.

Where the requirement is not practicable, the person will be provided with a full body harness that will be worn and attached above the wearer's head at all times and the lanyard must be fitted with a shock absorbing device or the person must be attached to a fall arrest system that is approved by the Client.

Where the requirements are not practicable, a suitable catch net must be erected.

Employees working in elevated positions must be trained to do this safely and without risk to their Health and Safety.

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 as well as the possibility of working in unsafe weather conditions.

Updated medical certificate confirming the fitness of employees working at a fall risk position should be kept on the Health and Safety file at all times.

SI 5.6 STRUCTURES

The Principal Contractor must ensure that:

Only skilled employees are allowed to erect structures and that the skills of these employees are being 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 where it becomes unsafe.

He or she 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
- Any other applicable information
- All drawings pertaining to the design are on site and available for inspection

SI 5.7 ACCESS SCAFFOLDING

Access scaffolding must be erected, used and maintained safely in accordance with Construction Regulation 16 and SA National of Standards Code of Practice, SANS 10085 entitled, "*The Design, Erection, Use and Inspection of Access Scaffolding".*

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. It must also be ensured that there is sufficient material available to erect the scaffolding properly.

Scaffolding must be erected, altered or dismantled by person(s) who has/have adequate training and experience in this type of work or under the continuous supervision of such a person.

SI 5.8 LIFTING EQUIPMENT

SI 5.8.1 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 Driven Machinery Regulation 18 of the OHS Act.

The Driven Machinery Regulation 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, the table of maximum loads should be used by the driver/operator
- Each winch on a lifting machine must at all-time have, at least, three full turns of rope on the drum when the winch has been run to its lowest limit

- Lifting equipment be fitted with a brake or other applicable device capable of holding the MML. This brake or device must automatically prevent the downward movement of the load when the lifting power is interrupted
- Lifting equipment fitted with a load limiting device that automatically arrest the lift when the load reaches its highest safe position or when the mass of the load is greater than the MML
- Every chain or rope on a lifting machine that forms an integral part of the machine must have a factor of safety as prescribed by the manufacturer of the machine and where no standard is available the factor of safety must be:

  - chains – 4 (four)
  - steel wire ropes – 5 (five)
  - fiber ropes – 10 (ten)

- Every hook or load attaching device must be designed such or fitted with a device that will 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 manufacturers prescription 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 an inspector of the Department of Labour

SI 5.9 LIFTING TACKLE

The following requirements will apply to lifting tackle:

- All lifting tackle must be examined at intervals not exceeding **3 months** by person as prescribed in DMR 18(10)(e) Records of such inspections must be kept in the safety file. Manufactured of sound material, well-constructed and free from patent defects
- Clearly and conspicuously marked with and identity number
- Maximum mass load factor of safety:

  - Natural fiber ropes 10 (ten)
  - Man-made fiber ropes and woven webbing 6 (six)
  - Steel wire ropes – single rope 6 (six)
  - Steel wire ropes – combination slings 6 (six)
  - Mild Steel chains 5 (five)
  - High tensile/alloy steel chains 4 (four)

- Steel wire ropes must be discarded (not used any further for lifting purposes) when wear and corrosion is evident and must be examined by a competent person every three months for this purpose and the results recorded in a designated log book
- Lifting tackle must be stored or protected as to prevent damage or deterioration when not in use.

SI 5.10 MACHINE OPERATORS

The following requirements will apply to machine operators:

- Only certified and/or competent employees may be allowed to operate any machinery
- Every lifting machine operator must be trained specifically for the type of lifting machine that he or she is operating
- Operators of Jib cranes with a maximum mass load of 500 kg or more must be in possession of a certificate of training issued by an accredited (*by the Department of Labour*) training provider.

SI 5.11 CONSTRUCTION VEHICLES AND MOBILE PLANT

Construction vehicles and mobile plant will initially during the competency evaluation process be inspected by the Principal Contractor prior to being allowed on a project site and suppliers of hired vehicles, plant and equipment will be required to comply with this specification as well as the OHS Act and Regulations.

Construction vehicles and mobile plant must be:

- Of acceptable design and construction
- Maintained in good working order
- Used in accordance with their design and intention for which they were designed
- Operated and/or driven by trained, competent and authorised operators/drivers
- No unauthorised persons to be allowed to drive construction vehicles and mobile plant
- Provided with safe and suitable means of access
- Fitted with adequate signalling devices to make movement safe including reversing
- Excavations and other openings must be provided with sufficient barriers to prevent construction vehicles and mobile plant from falling into same
- Provided with roll-over protection
- Inspected daily before start-up by the driver, operator and/or user and the findings recorded in a register/log book
- Fitted with two head and two tail lights that is in good working condition whilst operating under poor visibility conditions; and
- Used for transporting persons must have seats firmly secured and sufficient for the number of persons being transported
- Operators and drivers of construction vehicles and mobile plant must be in possession of a valid medical certificate declaring the operator and/or driver physically and psychologically fit to operate or drive construction vehicles and mobile plant
- No loose tools, material etc. is allowed in the driver and/or operators compartment/cabin nor in the compartment in which any other persons are transported
- No person may ride on construction vehicles and mobile plant except for in a safe place designed and provided for this purpose
- The construction site must be organized to facilitate the movement of construction vehicles and mobile plant in such a manner that pedestrians and other vehicles are not endangered. Traffic routes to be suitable, sufficient in number and adequately demarcated
- Construction vehicles and mobile plant left unattended after hours adjacent to roads and areas where there is traffic movement must be fitted with lights, reflectors or barricades to prevent moving traffic from a sudden emergency, or to come into contact with the parked construction vehicles and mobile plant

- In addition construction vehicles and mobile plant left unattended after hours must be parked with all buckets, booms etc. full lowered, the emergency brakes engaged and, where necessary, the wheels chocked, the transmission in neutral and the motor switched off and the ignition key removed and stored safely
- Employees employed adjacent or on public roads must wear reflective safety vests
- All construction vehicles and mobile plant daily inspection records must be kept in the Occupational Health and Safety file.

SI 5.12 ELECTRICAL INSTALLATIONS

The installation of temporary electricity for construction use shall be in accordance with Construction Regulation 24 and the Electrical Installation Regulations.

The Principal Contractor must ensure that:

- Existing services are located and marked before construction commences and during the progress thereof
- Where the abovementioned is not possible, employees with jackhammers etc. are protected against electric shock by the use of suitable protective equipment e.g. rubber mats, insulated handles etc
- Electrical installations and -machinery are sufficiently robust to withstand normal working conditions on site
- Temporary electrical installations must be inspected at least once per week by a competent person and a record of the inspections kept on the Occupational Health and Safety 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 on the Occupational Health and Safety file; and
- A competent person appointed in writing must control all temporary electrical installations.

SI 5.13 ELECTRICAL AND MECHANICAL LOCKOUT

An electrical and mechanical lockout procedure must be developed by the Principal Contractor and submitted to the Client for approval before construction commences. All Contractors on site must adhere to this lockout procedure.

SI 5.14 USE AND STORAGE OF FLAMMABLES

The Principal Contractor must 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 vapors being present unless adequate precautions is taken
- No flammables 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 sources 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 and sufficient firefighting equipment installed and fire prevention methods practiced for example proper housekeeping
- Flammables stored in a permanent flammable store are stored so that no fire or explosion is caused i.e.:

    - 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, door and roof and separated from adjoining rooms or workplaces by means of a two-hour fire retardant fire wall
- Adequate and suitable firefighting 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 etcetera to be stored together with flammables
- The flammable store to be designed and constructed to, in the event of spillage of liquids in the store, 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/vapors 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 as to the type of gas and empty and full cylinders.

SI 5.15 HOUSEKEEPING

The Principal Contractor must ensure that:

- Housekeeping is continuously implemented and maintained
- Materials and equipment is 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 by throwing from heights but by chute or crane
- Where practicable, construction sites are fenced off to prevent entry of unauthorized 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 and the likes 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 indoor workplace be sound and leak-free; and
- Openings in floors, hatchways, stairways and open sides of floors or buildings are barricaded, fences, boarded over or provided with protection to prevent persons from falling.

SI 5.16 STACKING AND STORAGE

The Principle 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 of the Department of Labour 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 or 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 structural or brick wall 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 can and does do it safely and that the stack is sufficiently stable to support 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
- Persons climbing onto stacks do not approach unguarded moving machinery or electrical installations.

SI 5.17 STORAGE OF FLAMMABLE AND HAZARDOUS CHEMICALS

See paragraphs 5.18 and 5.23 below.

SI 5.18 FIRE PREVENTION AND PROTECTION

The Principal Contractor must ensure that:

- The risk of fire is avoided
- Sufficient and suitable storage of flammables is provided
- Sources of ignition is obviated wherever flammable or highly combustible material is present in the workplace, for example
- Notices prohibiting smoking is 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 are allowed using electrically driven power tools that produces 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 firefighting equipment are provided and maintained in good working order
- Maintenance must include:

    - Regular inspections by a competent person appointed in writing and records of such inspections should be kept in the Occupational Health and Safety file
    - Annual inspection and service by an accredited service provider

- All employees are instructed in the use of the firefighting 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 and made known to employees;
- Evacuation is practiced to ensure that all persons are evacuated timeously
- Roll call is held after evacuation to account for all employees and to ensure that no-one including visitors have been left behind; and
- A clearly audible, to all persons on site, siren or alarm is fitted and regularly tested.

SI 5.19 EATING, CHANGING, WASHING AND TOILET FACILITIES

SI 5.19.1 Toilets

The provision of toilets for each sex is required in terms of the National Building Regulations and Construction Regulation 30.

Chemical toilets are allowed instead of the water borne sewerage type. Toilets have to be provided at a ratio of at least 1 toilet per 30 employees.

SI 5.19.2 Showers

At least cold-water showers of some sort for each sex have to be provided at a ratio of at least 1 shower per 15 employees.

SI 5.19.3 Change Rooms

Some form of screened off changing facility must be provided separately for each sex.

SI 5.19.4 Eating Facility

Some form of eating facility sheltered from the sun, wind and rain must be provided.

SI 5.19.5 Living Accommodation

Where the site is in a remote location and transport to home is not readily available, reasonable and suitable living accommodation must be provided.

SI 5.20 PERSONAL AND OTHER PROTECTIVE EQUIPMENT (SECTIONS 8, 15 AND 23 OF THE OHS ACT & GSR 2)

The Principal Contractor is required to proactively identify the hazards in the workplace and deal with them on an ongoing basis. He/she must either remove them or, where impracticable take steps to protect employees and make it possible for them to work safely and without risk to health under the hazardous conditions.
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 maintain the said equipment, that he/she instructs and trains the employees in the use of the equipment and ensures that the prescribed equipment is used by the employee/s.

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 prescribed protective equipment through health or any other valid reason, the employee cannot be allowed to continue working under the hazardous condition(s) for which the equipment was prescribed but an alternative solution has to be found that may include relocating the employee.

The Principal Contractor may **not charge any fee** for protective equipment prescribed by him or her **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;
- 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 the Client's projects:

- New protective overalls
- New protective footwear
- New protective headwear; and
- Eye/face & hand protection where necessary.

SI 5.21 PORTABLE ELECTRICAL TOOLS AND 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 i.e. drills, saws, grindstones, portable lights, etcetera. In addition 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 must be governed by the following:

- Regular inspections by a competent person appointed in writing
- Inspection results must be recorded in a register
- Only competent authorized persons are allowed to use portable electrical tools and equipment; and
- The correct protective equipment is worn / 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 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.

SI 5.22 PORTABLE LIGHTS

The following requirements apply to portable lights:

- Must be fitted with a robust non-hygroscopic non-conducting handle
- Live metal 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
- A register be kept for each piece of equipment with findings of regular inspections undertaken to evaluate the condition of these lights
- Inspections must be undertaken that concentrate on at least the plug, cord, switch and any obvious faults; and
- When used in wet/damp/metal container conditions, it must be protected.

SI 5.23 PUBLIC HEALTH AND SAFETY (SECTION 9 OF THE OHS ACT)

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 said construction work as well as the precautionary measures to be observed to avoid or minimize those dangers. This includes:

- Non- employees entering the site for whatever reason
- The surrounding community; and
- Passersby the site.

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 site applicable induction into the hazards and risks and the control measures for these.

SI 5.24 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 7 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 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 said hazardous chemical substances
- Hazardous chemical substances containers be clearly marked as to 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 is 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.

SI 5.25 EXCAVATIONS (INCLUDING PILING)

Where excavations or any part thereof will exceed 1.5 m in depth the Principal Contractor will be required to submit a method statement to the Client for approval before commencing with the excavation and the Client will issue a permit to precede once the risk assessment and method statement is approved.

Regardless of the above, all excavation work has to comply with the following:

- Excavation work must be carried out under the supervision of a competent person with at least two years practical experience in excavation work who has been appointed in writing
- Before excavation work begins the stability of the ground must be evaluated
- Whilst excavation work is being performed, the Principal 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 or where the sides of the excavation are sloped back to at least the maximum angle of repose measured relative to the horizontal plane, shoring or bracing may be left out **but only after** written permission has been obtained from the appointed competent person
- Shoring and bracing must be designed and constructed to safely support the sides of the excavation and prevent it from collapsing
- Where uncertainty exists regarding the stability of the soil the opinion of a competent professional engineer or professional technologist must be obtained whose opinion will be decisive. The opinion must be in writing and signed by the engineer or technologist as well as the appointed excavator
- No load or material may be placed near the edge of an excavation if it is likely to cause a collapse of the 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 meters of any employee within the excavation at any time
- The location and nature of any existing services such as water, electricity, gas, telecommunication etcetera 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 employees working in or near in the excavation
- Every excavation, including the shoring and bracing or any other method to prevent collapse, must be inspected by the appointed competent person as follows:

    - Daily before work commences
    - After every blasting operation
    - After an unexpected collapse of the excavation or part thereof
    - After substantial damage to any support
    - After rain

- The results of any inspections must be recorded in a register kept on site
- 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 off to at least one meter high and as close to the excavation perimeter as practicable
- Provided with warning lights or visible boundary indicators after dark or when visibility is poor
- Upon entering an excavation the requirements of General Safety Regulation 5 must be observed:
- Any confined space may only be entered after the air quality has been tested to ensure that it is safe to breathe and does not contain any flammable or noxious air mixture.
- The confined space must be purged and ventilated of any hazardous or flammable gas, vapor, dust or fumes
- The safe atmosphere must be maintained
- Employees are to be provided with breathing apparatus and wearing a safety harness with a rope with the free end of the rope being continuously attended to by a person outside the confined space
- Furthermore, an additional person, trained in resuscitation, to be in full-time attendance immediately outside the confined space
- Additional serviceable breathing and rescue apparatus is kept immediately outside the confined space for rescue purposes

- All pipes, ducts etcetera that may leak into the confined space to be blanked off sufficiently to prevent any leakage or seepage
- The employer must ensure that all employees have left the confined space after the completion of work
- Where flammable gas is present on or in a confined space no work may be performed in close proximity to the flammable atmosphere that may ignite the flammable gas or vapor.

SI 5.26 WORKING IN CONFINED SPACES (SUCH AS MANHOLES)

SI 5.26.1 VENTILATION

The confined space or manhole cover and two adjacent covers must be opened (*i.e. a total of three manholes*) and the confined space or manhole be allowed to ventilate for at least 15 minutes before entering the manhole. All open manholes must be barricaded and manned at all times.

A gas monitor must be lowered to the bottom of the confined space or manhole with a rope to test the presence of any toxic/flammable gas. If any gas is detected, the space or line must be force ventilated by means of a blower for at least 15 minutes where after the air must be tested again. Under no circumstances may any space or manhole be entered while there is a toxic/flammable gas present.

After the undertaking of the necessary work, the person in charge of the activities must confirm that all the employees are accounted for and ensure that all the manholes are properly closed and barricading removed.

SI 5.26.2 LATERAL SUPPORT

Lateral support is a specialized operation. The results of the preliminary examination of the structure to be underpinned and any adjacent structure will determent the working method to be adopted.

The Engineer in charge must specify the precise plan of operations and timetable, together with a list of the necessary material and equipment.
Before the work begins all the equipment and materials required for safety measures should be provided and ready for use.

Lateral support operations should be carried out under the direction of a competent experienced person who should be in constant attendance at the site.

SI 5.26.3 ENTERING A MANHOLE

When entering a confined space or manhole, the person entering the space or manhole must wear a safety harness, fully operational 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 manhole. At least one person on the surface must be trained in basic first-aid (*level 1*).

No person shall remain within a confined space or manhole for a period of more than one hour at a time. A minimum of 5 minute rest periods on the surface must be taken after this period before re-entering.

Should the alarm sound on the gas monitor, the employees must exit the confined space or manhole and the immediate area must also be evacuated immediately. The area must be properly ventilated and re-tested before re-entering the confined space or manhole. Professional support should be called for if necessary.

Employees must be provided with flameproof lighting when entering deep manholes or manholes with flammable gases. No naked lights, smoking or unprotected electrical apparatus which may cause sparks, shall be permitted in any manhole or confined space or in their vicinity.

SI 5.26.4 GENERAL

All employees working in confined spaces or manholes must be issued with fully functioning gas monitoring equipment and safety harnesses as well as self-rescuers where applicable. All these employees must be trained (*including refresher training on a continuous basis*) in the use thereof.

Where over-pumping between manholes is involved, only leak free pumping machines and conveyance tubes must be used and allowed.

SI 5.26.5 SAFETY EQUIPMENT

All teams must be issued with fully functional gas monitoring equipment and safety harnesses and self-rescuers where applicable. All employees must be trained *(including refresher training on a continuous basis*) in the use thereof.

SI 5.26.6 GENERAL RECORDS

The following records shall be implemented and maintained by the Principal Contractor:

- Confined space entry permits
- Confined space entry registers
- Safety harness registers

SI 5.26.7 TRAINING

All employees that have to enter a confined space or manholes must be formally trained before being required to enter such areas (*new employees to complete this training before working in a confined space*).

Refresher courses must be attended by employees at least every 2 years or immediately if new methodologies or equipment are adopted or acquired.

Continuous onsite training and support by supervisory staff should be undertaken.

SI 5.27 TEMPORARY WORKS

Temporary Works must be carried out under the supervision of competent person designated in writing.

Temporary Works structures must be so designed, erected, supported, braced and maintained that it will be able to support any vertical or lateral loads that may be applied.

No load may be imposed onto the structure that the structure is not designed to carry.

Temporary Works must be erected in accordance with the structural or brick wall design drawings for such Temporary Works and if there is any uncertainty, the designer must be consulted before proceeding with the erection/use of the Temporary Works.

All drawings pertaining to the Temporary Works must be kept available on site.

All equipment used in the erection of Temporary Works must be checked by a competent person before use.

The foundation or base upon which the Temporary Works is erected must be able to bear the weight and keep the structure stable.

Employees erecting Temporary Works must be trained in the safe work procedures for the erection, moving and dismantling of the Temporary Works.

Safe access and emergency escape must be provided for employees.

A competent person must inspect the Temporary Works structures that have been erected before, during and after pouring of concrete or the placing of any other load and thereafter daily until the Temporary Works is stripped. The results of all inspections must be recorded in a register kept on site.

The Temporary Works must be left in place until the designated competent person has authorised its stripping in writing.

Any damaged Temporary Works must be repaired and/or rectified without delay.

Deck panels must be secured against displacement.

The slipping of employees and other persons on release agents on deck panels must be prevented at all times.

Employees' health must be protected against the use of solvents, oils or other similar substances.

SI 5.28 DEMOLITION WORK

Demolition work must be carried out under the supervision of a competent person who has been appointed in writing.

- A detailed structural or brick wall engineering survey of the structure to be demolished must be carried out and a method statement on the procedure to be followed in demolishing the structure or brick wall must be developed by a competent person, before any demolition may be commenced
- As demolishing progresses the structural or brick wall or brick wall integrity of the structure must be checked at intervals as determined in the method statement by the appointed competent person in order to prevent any premature collapse.

Steps must be taken to ensure that where a structure or brick wall is being demolished:

- No floor, roof or any other part of the structure is overloaded with debris or material that would make it unsafe
- Precautions are taken to prevent the collapse of the structure or brick wall when any frame or support is cut or removed
- Shoring or propping is applied where necessary
- No employee is required or allowed to work under unsupported overhanging material; and
- The stability of an adjacent building, structure or brick wall or road is maintained at all times
- The location and nature of any existing services such as water, electricity, and gas etcetera must be established before any demolition is commenced with and any service that may be affected by the demolition must be protected and made safe for employees and other persons
- Every stairwell in a building being demolished must be adequately illuminated
- Convenient and safe means of access must be provided
- A catch platform or net must be erected over every entrance to the building or structure being demolished where the likelihood exists of material or debris falling on employees and/or persons entering and leaving and every other area where the likelihood exists of material or debris falling on employees and/or persons must be fenced or barricaded
- No material may be dropped on the outside of the building unless the area into which it is dropped is fenced off or barricaded.

Waste and debris may only be disposed of from a height in a chute with the following design:

- Adequately constructed and rigidly fastened
- Inclined >45 degrees and enclosed on all four sides
- Fitted with a gate or control mechanism to control the flow of material that may not freefall down the chute
- Discharged into a container or a barricaded area; and
- Demolition equipment may only be used on floors or slabs that are able to support it.

Asbestos related work must be conducted to the requirements of the Asbestos Regulations promulgated under the OHS ACT and in particular Asbestos Regulation 21, i.e.:

- Demolition of asbestos may only be carried out by a registered (*with the Department of Labour*) asbestos contractor
- All asbestos materials likely to become airborne must be identified; and
- A plan of work must be submitted for approval to an Approved Asbestos Inspection Authority (*AAIA*), whom is approved by the Department of Labour, 30 days prior to commencement of demolishing work unless the plan was drawn up by an AAIA and a signed *(by all parties)* copy is submitted to the Department of Labour 14 days before commencement of the demolishing.

During demolition work:

- All asbestos containing material must be disposed of safely
- Employees must be issued with appropriate PPE and the proper use thereof enforced; and
- After the demolition has been completed the area/premises must be thoroughly checked to ensure that all asbestos waste has been removed

- No employee is allowed to:

    - Use compressed air or permit the use of compressed air to remove asbestos dust from any surface or employee or person;
    - Smoke, eat, drink or keep food or beverages in an area not specifically designated for this; and
    - Apply asbestos by spraying.

- Lead related work must be conducted to the requirements of the Lead Regulations promulgated under the OHS Act
- Where demolition works will involve the use of explosives, a method statement must be developed by a competent person in accordance with applicable explosives legislation.

SI 5.29 EXPLOSIVE POWERED TOOLS

The Principal Contractor shall not use or permit any person to use an explosive powered tool, unless:

- it is provided with a protective guard around the muzzle end, which effectively confines any flying fragments or particles
- The firing mechanism is so designed that the explosive powered tool will not function unless-
- It is held against the surface with a force of at least twice its weight; and
- The angle of inclination of the barrel to the work surface is not more than 15 degrees from a right angle, provided that the provisions of this requirement will not apply to explosive powered tools in which the energy of the cartridge is transmitted to the bolts, nails or similar relevant objects by means of an intermediate piston which has a limited distance of travel.

The Principal Contractor shall ensure that:

- Only cartridges suited for the explosive powered tool and the work to be performed are used;
- The explosive powered tool is cleaned and examined daily before use and as often as may be necessary for its safe operation by a competent person who has been appointed
- That the safety devices are in proper working order prior to use
- When not in use, the explosive powered tool and the cartridges are locked up in a safe place, which is inaccessible to unauthorised persons
- The explosive powered tool is not stored in a loaded condition
- A warning notice is displayed in a conspicuous manner wherever the explosive powered tool is used
- The issuing and collection of cartridges and nails or studs are- controlled and done in writing by a person having been appointed in writing; and
- Recorded in a register and that the recipient has accordingly signed for the receipt thereof as well as the returning of any spent and unspent cartridges;

The Principal Contractor shall not permit or require any person to use an explosive powered tool unless such person has been:

- Provided with and uses suitable protective equipment; and
- Trained in the operation, maintenance and use of such tool.

SI 5.30 WELDING, FLAME CUTTING OR SIMILAR OPERATIONS

A competent person will be appointed to supervise welding, flame cutting or similar operations on site.

The following rules will govern all welding and flame cutting or similar operations:

- The welder will be trained regarding the safe use/operation of the equipment
- The welder and his assistant will be provided with effective and appropriate personal protective equipment and/or clothing
- Cables and electrode holders will be effectively insulated
- The workplace will be effectively screened off to prevent bystanders from being affected by the welding rays or they will be provided with protective equipment
- Special precautions will be taken where welding is undertaken in confined spaces e.g. proper and sufficient ventilation will be provided
- In wet or damp conditions the welding equipment and the welder will be properly insulated and someone will be on standby to assist in the event of any emergency
- A qualified person will certify in writing that it is safe to enter and work in a specific confined space before welding or flame cutting is undertaken
- No welding, flame cutting, grinding, soldering or similar work shall be undertaken in respect of any drum, vessels or similar object or container where such object or container:

    - Is completely closed, unless the rise in internal pressure cannot render in dangerous; or
    - Contains any substance which, under the action of heat may explode or react to form dangerous or poisonous substances.

- Where pressure vessels/welding cylinders containing oxygen or acetylene are transported or used, the proper precautionary measures will be taken against bumping, falling, rolling etcetera.
- Gas welding hoses may only be joined with approved connectors and clamps
- No oil or grease may be applied to oxygen valves and fittings
- It is a sound practice to store pressure vessels and/or welding cylinders vertically and to secure them by means of a chain
- Acetylene cylinders may never be inclined in excess of 45º
- Proper and adequate fire prevention measures will be instituted and maintained for as long as the welding continues; and
- Where explosive and/or flammable vapors are present, welding will be done under "*hot work*" permits.

SI 5.31 TRANSPORTATION OF EMPLOYEES

Any vehicle used to transport employees must have seats firmly secured and adequate for the number of employees to be carried.

The Principal Contractor shall not allow employees to be transported in a goods vehicle unless the portion of the vehicle in which the employees are being conveyed is enclosed to a height of:

- at least 350 mm above the surface on which employees are seated; or
- at least 900 mm above the surface on which employees are standing,

in a manner and with a material of sufficient strength to prevent employees from falling from such vehicle when it is in motion.

SI 5.32 PILING DRIVING OPERATIONS

The Contractor appointed to do Piling Driving Operations will be competent and will also appointed.

The area where Piling Driving Operation is to be done will be barricaded. The necessary signs will be promptly displayed.

Daily checklist will be completed on piling machines and operators will comply with Construction Regulation 23(1)(k).

The Method statement and Risk assessment will be available.

SI 5.33 HEALTH AND SAFETY POLICY

The Principal Contractor has to provide the Client, as an annexure to the Health and Safety Plan, with a detailed Health and Safety Policy outlining the Principal Contractor's stance on and principles adopted for Health and Safety.

SI 5.34 COST FOR HEALTH AND SAFETY MEASURES DURING THE CONSTRUCTION PROCESS

To ensure that the appointed Principal Contractor comply with Construction Regulation 5(1)(g) and have made provision for the cost of Health and Safety measures during the construction process.

SI 5.35 SITE ACCESS

The owner of any land on which excavation work is in progress or on any building is erected or demolished shall take precautions in the working area and on surrounding roads and footways to limit to a reasonable level the amount of dust arising from the work or surroundings thereof.

Access will be through the contractor's entrance. **Proper site identification must be issued to all workers**.

No person shall during the course of any building, demolition or excavation work use any machine, machinery, engine, apparatus, tool or contrivance, which in the opinion of the local authority may unreasonably disturb or interfere with the amenity of the neighbourhood.

The working hours state in Regulation F6(2)(a) of the National Building Regulations and Building Standards 103/1977 to be strictly obeyed:

i. Working hours: Monday – Friday before 07:00 or after 18:00 on any day other than those days contemplated in subparagraphs ii and iii.
ii. Saturdays: before 07:00 or after 15:00.
iii. Public Holidays & Sundays: no work.

- Working on site outside these hours is prohibited unless arrangements have been made with the Project Manager for competent supervision and the correct equipment will be on site.

- The site will be adequately fenced or hoarded and access to the site shall be controlled, signs will be placed on gates/ fence warning public of construction area. All visitors/ deliveries shall be recorded in the visitor's book in site/ foreman office.

SI 5.36 SITE ORGANOGRAM

The Principal Contractor will display a site organogram and 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 are included and available in the site office.

SI 5.37 DUTY TO INFORM

The Principal Contractor will inform the CLIENT of any information that is not covered in the Health and Safety Specifications.

SI 6 MEASUREMENT AND PAYMENT

SI 6.1 MEASUREMENT AND PAYMENT

SI 6.1.1 The scheduled items for health and safety will be included in the preliminary and general section of the schedule of quantities. Measurement will be in terms of Clause 8.1.2 of SABS 1200 A.

SI 6.1.2 The Contractor shall price all items scheduled in this section of the schedule of quantities to enable the Employer to comply with clause 5.1(g) of the Construction Regulations, 2014. Failure by the Contractor to price these items will force the Employer to reject the Contractor's tender in terms of clause 5.1(h) of the Construction Regulations, 2014.

SI 6.1.3 Payment for the scheduled items will be in terms of clause 8.2 of SABS 1200 A.

SI 6.2 SCHEDULING ITEMS

SI 6.2.1 FIXED-CHARGE ITEMS

a) Preparation of Health and Safety Plan……...Unit: Sum

The sum shall cover all costs involved in the preparing the Health and Safety Plan (which includes the risk assessment), which shall include the preparation of all permit applications and notifications as required by this specification and shall include the employment cost of all health and safety personnel employed for the preparation of the Contractor's Health and Safety Plan.

b) Health and Safety Training (site specific and other) ……..……...……..…Unit: sum

The sum shall cover all costs involved in preparation of all the necessary Health and Safety Induction Training materials required from the training of the Contractor's employees, Subcontractors and all visitors to the Works.

c) Personal Protective Clothing and equipment……..……...…….……Unit: Sum

The sum shall cover all costs involved in the initial provision of all personal protective clothing and equipment for the Contractor's employees and Subcontractors and any visitors to the Works, as required by this specification (which includes the requirements of the Occupational health and Safety Act, 1993 and its regulations, as amended)

d) Fences, Signs and Barricades……..……...……..…… Unit: Sum

The sum shall cover all costs involved in the initial provision of all fences, signs and barricades necessary for the protection of all persons, plant, vehicles, equipment or facilities, as required by this specification (which includes the requirements of the Occupational Health and Safety Act, 1993 and its regulations, as amended)

e) Establishment of Safety Administration……..……...……..…… Unit: Sum

The sum shall cover all costs involved in establishment of all administrative matters required by this specification which shall include, but not be limited to, the establishment of the Health and Safety File.

f) Other Health and safety Fixed-charge Obligations……..……...……..……Unit: Sum

The sum shall cover the fixed costs of all other obligations that are required for the safe execution of the Works in accordance with the requirements of this specification and that are not specifically covered in 10.2.1(a),(b),(c),(d) or (e).

SI 6.2.2 TIME-RELATED ITEMS

a) Implementation and maintenance of Health and Safety Plan…….……...….. Unit: Month

The rate shall cover all the monthly costs involved in the implementation and maintenance of the Health and Safety Plan. This shall include but shall not be limited to the following:

1) The employment cost of all health and safety personnel including consultants, health and safety officers, inspectors, supervisors and issuers required in terms of the Contractor's Health and safety Plan,
2) Updating the Health and safety Plan as needed.
3) Carrying out of periodic audits and follow-up audits,
4) Compilation of ongoing risk assessments and risk assessment reports as are required by the Works,
5) Convening of regular safety meetings with the Safety Representatives,
6) Accompanying and supporting the Employer or his Safety Agent during ad hoc audits,
7) Compilation of monthly safety reports and statistics for the Employer or his Safety Agent.

b) Implementation and maintenance of Training……..……...…….……Unit: Month

The rate shall cover all the monthly costs involved in the implementation of the induction training of the Contractor's employees, Subcontractors and all visitors to the Works.

c) Maintenance of Personal Protective Clothing and Equipment…….……...…Unit: Month

The rate shall cover all the monthly costs involved in maintenance, repair or replacement of personal protective clothing required by the Contractor's employees or Subcontractors and all visitors to the Works.

d) Maintenance of Fences, Signs and Barricades…….……...…….…….Unit: Month

The rate shall cover all the monthly costs involved in maintenance, repair or replacement for whatever reason of fences, signs and barricades used for the Works. The rate shall include for the provision of security guards for the safeguarding of the items provided should this be necessary.

e) Implementation and maintenance of Safety Administration…….……...……Unit: Month

The rate shall cover all the monthly costs involved in establishment of all administrative matters required by his specification which shall include, but not limited to, the maintenance of the Health and Safety File or the completion and recording of the safety check lists required by this specification.

f) Other Health and Safety Time-related Obligations…….……...…….……Unit: Month

The rate shall cover all the monthly time-related costs of all other obligations that are required for the proper execution of the Works in accordance with the requirements of this specification and that are not specifically covered in 10.2.2(a), (b), (c), (d) or (e).

SI 7 MANDATARY AGREEMENT BETWEEN CLIENT AND PRINCIPAL CONTRACTOR

OCCUPATIONAL HEALTH & SAFETY ACT 85 of 1993
CONSTRUCTION REGULATIONS 2014

1 AGREEMENT WITH MANDATARY

In terms of Section 37(1) & (2)

1.1 WRITTEN AGREEMENT ENTERED INTO AND BETWEEN

_____

(Hereinafter referred to as Client)

1.1.1 AND

_____

1.2 (PRINCIPAL CONTRACTOR)

Signature Client H&S: _____ Signature: Principal Contractor: _____

Date: _____ Date: _____

AGREEMENT WITH MANDATARY TO BE COMPLETED IN BLACK INK AND EACH PAGE AND ANY CHANGE MADE TO BE INITIALLED

Occupational Health & Safety Act of 1993 and Construction Regulations 2014

Requirements:

1. Your attention is drawn to "General Duties of Employers to their Employees" as required by Section 8 of the Act
2. You are required to:

2.1 Sign a written "Agreement with Mandatary" as required by Sect 37(1)) 2) of the Act before commencing any work on site.

2.2 Ensure that all your employees receive the necessary Induction Training and have proof of thereof.
Note: *You must ensure that all employees under your control are informed, instructed and trained by a competent person regarding any hazard and the related work procedures before any work commences.*

2.3 Ensure the provision of Welfare Facilities for your employees as per Construction Regulation 30.

2.4 Provide the Client with your SHE Plan.

2.5 Ensure that Method Statements, Risk Assessments and Safe Work Procedures are done and available.

2.6 Provide the Client with written appointment of the person who is going to supervise the construction per Construction Reg. 8(7).

2.7 Provide the Client with written designation of your nominated Health & Safety Representative as per Section 17(1).
Note: *Your Health & Safety Representative will be expected to attend the Client safety meetings.*

2.8 If you employ more than five (5) persons, you are required to provide your own First Aid Box GSR 3(2).

2.9 If you employ more than ten (10) persons, you are required to provide your own qualified First Aider as per GSR 3(4).
Note*: If you have difficulty in complying with items 2.7 & 2.8 above, you may arrange/come to an agreement with the Client to make use of his First Aid facilities in case of injury. You will be expected to communicate such an agreement to your employees.*

2.10 When working with Hazardous Chemical Substances, comply with HCS Reg. 3.
Note: Asbestos and Lead Regulations are separate.

2.11 When using a Materials Hoist, comply with the requirements of Construction Reg. 19.

2.12 When using Lifting Machines & Lifting Tackle, comply with DMR. 18.
Note*: You may be required to appoint a Banksman to control Lifting / Slinging operations.*

2.13 When erecting / using Scaffolding comply with the requirements of SANS 10085 "Access Scaffolding".

2.14 When erecting / using Suspended Platforms comply with the requirements of Construction Reg. 17.

2.15 When doing Demolition Work, comply with Construction Reg. 14.

2.16 When doing Blasting to comply with Explosives Regulations Chapter 10.

2.17 When doing Excavation Work, comply with Construction Reg. 13.

2.18 When doing Electrical Installations, comply with the requirements of Construction Reg. 24.
Note: *Electrician to provide copy of registration as per Elect. Install. Reg. 9(3).*

2.19 When using Construction Vehicles, comply with Construction Reg. 23.

2.20 When using / erecting Temporary Works, comply with Construction Reg.12.

2.21 When working over or in close proximity to Water, comply with Construction Reg.26.

2.22 Ensure that good Housekeeping, Stacking & Storage principles are applied on this project as per Construction Reg. 27 & 28.

2.23 Ensure that appropriate measures are taken to avoid the risk of Fire / Explosion and comply with requirements of Construction Reg. 29.

2.24 If you are going to work at heights a Fall Protection Plan must be submitted (roof work included) as per requirements of Construction Reg. 10.

2.25 When using Explosive Powered Tools, comply with GSR 19.

2.26 When Welding, Flame Cutting / Soldering, comply with GSR 9.

2.27 When working in Confined Spaces, comply with GSR 5.

3 You are responsible for providing your own **legal safety documents** and **registers** to comply with the Act's requirements. *A copy of the OHS Act of 1993 and the Construction Regulations 2014 will be available for perusal in the Client's **site** office.*

Signature Client H&S: _____ Signature: Principal Contractor: _____

Date: _____ Date: _____

4 You are required to comply with General Safety Regulation 2(1) to (7) and provide your employees with personal protective equipment which will allow them to carry out their work in a safe manner, e.g. hard hats, safety harnesses, gloves, safe footwear, eye protection, ear protection, waterproof clothing etc.

5 Reporting of Incidents and Occupational Diseases shall be done as per General Admin. Regulation 8 (Also see Sect 24 of the Act).

6. Compensation for Occupational Injuries & Diseases Act (No 130 of 1993). You are required to provide the Client/Client with proof of registration with the Compensation Commissioner/Federated Employer(s) Mutual when signing this agreement. If you are not registered, the Client/Client may deduct the necessary amounts from your progress payments and pay it over to the Commissioner to ensure that you are insured. **See Section 80 & 89 of the COID Act.**

Signature: _____ Signature: _____

(Client) (Principal Contractor)

AGREEMENT WITH MANDATARY

In terms of Section 37(1) and (2)

Definition of Mandatary

- Includes an agent, a contractor or sub-contractor for work, but without derogating from his status in his own right as an employer or user

Section 37(1) Whenever an employee does or omits to do any act, which it would be an offence in terms of this Act for the employer of such employee or a user to do or omit to do, then, unless it is proved that-

(a) in doing or omitting to do that act the employee was acting without the connivance or permission of the employer or any such user;

(b) it was not under any condition or in any circumstance within the scope of the authority of the employee to do or omit to do an act, whether lawful or unlawful, of the character of the act or omission charged; and

(c) all reasonable steps were taken by the employer or any such user to prevent any act or mission of the kind in question, the employer or any such user himself shall be presumed to have done or omitted to do that act, and shall be liable to be convicted and sentenced in respect thereof; and the fact that he issued instructions forbidding any act or omission of the kind in question shall not, in itself, be accepted as sufficient proof that he took all reasonable steps to prevent the act or omission.

Section 37(2) The provisions of subsection (1) shall *mutatis mutandis* apply in the case of a mandatary of any employer or user, **except if the parties have agreed in writing to the arrangements and procedures between them** to ensure compliance by the mandatary with the provisions of this Act.

Signature Client H&S: _____ Signature: Principal Contractor: _____

Date: _____ Date: _____

ACCEPTANCE OF MANDATARY

In terms of the provisions of Section 37(2) of the Occupational Health & Safety Act 1993

I, _____

acting for and on behalf of

_____ **(Company/Close Corporation/ Enterprise/Owner /User)** undertake to ensure that the requirements and provisions of the Act and Regulations are complied with.

Signature: _____ Print Name: _____
(Principal Contractor)

Designation: _____ Date: _____

Mandatary-Workmen's Compensation/Federated Employers Mutual No.: _____

A copy of company/Close corporation "Letter of Good Standing" to be attached.

Signature: _____ Print Name: _____
(Client**)**

Designation: _____ Date: _____

Company: _____

Project / Site: _____

CLIENT

Construction Regulation 5

5(1) A client must:

(a) prepare a baseline risk assessment for an intended construction work project;
(b) prepare a suitable, sufficiently documented and coherent site specific health and safety specification for the intended construction work based on the baseline risk assessment contemplated in paragraph (a)
(k) to appoint each Principal Contractor in writing for the project or part thereof on a construction site

Signature Client H&S: _____ Signature: Principal Contractor: _____

Date: _____ Date: _____

APPOINTMENT

I (Client), _____

of: (Company) _____

appoint (Name): _____

as the Principal Contractor for PROJECT/SITE:

_____

_____

CONSTRUCTION COMPANY / CLOSE CORPORATION:

_____

Your attention is drawn to the following requirements:

1. Ensure that the Provincial Director is notified of the intended construction work.
2. Provide the Client with a suitable and sufficiently documented health & safety plan, based on the Client's documented H & S specifications.
3. Take reasonable steps to ensure co-operation between all contractors so as to enable compliance with the Construction Regulations.
4. Provide appointed Contractors with the applicable sections of the health & safety specifications pertaining to their work.
5. Appoint each Contractor in writing for the construction work he/she has to carry out.
6. Take reasonable steps to ensure compliance by Contractors which shall include monthly safety audits
7. Stop any Contractor from executing work which is not in compliance with safety specifications or poses a threat to other persons.
8. Ensure that where changes are brought about to the design / construction, sufficient health & safety information and appropriate resources are made available to Contractors to execute their work safely.
9. Ensure that every Contractor is registered and in good standing with the Compensation Commissioner.
10. Ensure that potential Contractors, submitting tenders have made provision for the cost for health & safety during construction.
11. Ensure that a health & safety file, with all documentation required in terms of the Act & Regulations is open & kept available on site.
12. Keep a comprehensive and updated list of all Contractors accountable to the Client; as well as all agreements between the parties and the type of work to be done.
13. On completion of construction work, hand over a consolidated health & safety file to the Client.
14. Notify the Client of all incidents that have to be reported, recorded and investigated as per Sec. 24 of the Act and Gen. Adm. Reg. 8.
15. Ensure that method statements, risk assessments and safe work procedures are in place before commencement of construction work.
16. Ensure that all employees, including those of Contractors, undergo health & safety induction training pertaining to the construction hazards and be in possession of proof of the health & safety induction training given.

Signature: _____ Date: _____
(Client)

Designation: _____

Signature Client H&S: _____ Signature: Principal Contractor: _____

Date: _____ Date: _____

ACCEPTANCE OF APPOINTMENT

I,_____Designation: _____
(Principal Contractor)

hereby accept the requirements of this appointment.

Signature: _____

Date: _____

Signature Client H&S: _____ Signature: Principal Contractor: _____

Date: _____ Date: _____

LOWVELD BOTANICAL GARDENS

BASELINE HAZARD IDENTIFICATION & RISK ASSESSMENT

METHODOLOGY OF RISK QUANTIFICATION

Seriousness rating	Description
1	No injury or illness
2	First-aid treatment case, medical treatment case and temporary discomfort case
3	Medical mitigation case; occupational disease with non-permanent effect
4	Lost Time Injury. Occupational disease with permanent consequence e.g. hearing loss
5	Fatality (as result of incident or occupational disease e.g. asbestosis
6	Multiple fatalities or multiple permanent occupational diseases

Likelihood that the event will occur	
Category	**Criteria**
E	99% probability, or
	impact is occurring now, or
	Could occur within "days to weeks"
D	Less than 50% probability or
	Balance of probability it will occur, or
	Could occur within "weeks to months"
C	Less than 20% probability, or
	May occur shortly but a distinct probability it will not, or
	Could occur within "months to years"
B	Less than 5% probability
	May occur but not anticipated, or
	Could occur in "years to decades"
A	
	occurrence requires exceptional circumstances
	Only occurs as a "100-year event"

Plot consequence & likelihood in risk matrix to determine risk priority level						
Seriousness	6	III	II	I	I	I
	5	III	II	II	I	I
	4	IV	III	II	I	I
	3	IV	III	II	II	I
	2	IV	IV	III	II	II
	1	IV	IV	III	III	III
		A	B	C	D	E
Likelihood						

Evaluate the risk based on the level of risk determined, as well the Effectiveness of the current risk controls			
Priority	**Risk ranking**	**Action required**	**Escalation**
I	Very high	Immediate action	Report to CEO & Client Agent
II	High	Strong mandatory	Report to Contracts Manager & Client Agent
III	Medium	Action possibly at administrative level	Report to Contracts manager
IV	Low	Minor or no action	No escalation required

HAZARD IDENTIFICATION, RISK ASSESSMENT AND CONTROLS

No.	Potential hazard	Potential risk	Controls	H-S-E Identifi-cation	S	L	Risk rating	Legal reference
1	Temporary hoarding to separate public and construction work.	The erector must follow the specific position as indicated by the Engineers Drawing. When digging for fence poles, services can be damaged. When fence standards are knocked in it can damage services.	The principal contractor or their appointed contractor should have a detailed risk assessment to reduce the high risk rating to within a lower controlled risk rating The detailed risk assessment by the contractor should be done in such a manner that the Health and Safety of persons, the safe guarding of machinery and structures are assured at all times.	S	5	E	5D	Occupational Health and Safety Act and Regulations (85 of 1993) and incorporated safety standards.
2	Site establishment	-Safety signs and notice boards not placed close to entrances -Lay down areas not of sufficient size -No toilets provided as per requirements -Not informing employees and public what the site rules are -Damaged/Loose wires exposed at site office. -Unauthorized passage of foreign immigrants or members of public can cause assaults or loss of material	As above	H; S	5	D	5D	As above

No.	Potential hazard	Potential risk	Controls	H-S-E Identifi-cation	S	L	Risk rating	Legal reference
3	Parking of plant vehicle in public road	▪ The practice of unsafe parking can cause damage to structures and equipment and Injuries to people ▪ Damage to underground services	The principal contractor or their appointed contractor should have a detailed risk assessment to reduce the high risk rating to within a lower controlled risk rating The detailed risk assessment by the contractor should be done in such a manner that the Health and Safety of persons, the safe guarding of machinery and structures are assured at all times.		6	E	6E	Occupational Health and Safety Act and Regulations (85 of 1993) and incorporated safety standards
4	Exit/Entry into the public roads	Injuries to pedestrians and/or collisions with private vehicles	As Above	S	6	E	6E	As Above
5	Receiving, off-loading and loading of equipment and/or material	Receiving and off-loading of equipment and material can cause: Damage to structures and equipment Injuries to people Pollution/spillage	As Above	S; E	6	D	6D	As Above
6	Ladders	The unsafe use of ladders can cause: Falls Damage to equipment	As Above	S	6	E	6E	As Above
7	Open Edges	Lack of protection on all open edges can cause falls, serious injuries and even death.	As Above	S	6	E	6E	As Above

No.	Potential hazard	Potential risk	Controls	H-S-E Identifi-cation	S	L	Risk rating	Legal reference
8	Excavations	Lack of shoring or sloping of edges can cause collapse of side walls and can cause bodily harm and even death	The principal contractor or their appointed contractor should have a detailed risk assessment to reduce the high risk rating to within a lower controlled risk rating The detailed risk assessment by the contractor should be done in such a manner that the Health and Safety of persons, the safe guarding of machinery and structures are assured at all times.	S	6	D	6D	Occupational Health and Safety Act and Regulations (85 of 1993) and incorporated safety standards
9	Explosive actuated fastening device	Unsafe use or lack of control can cause bodily harm and damage of equipment	As Above	S	6	D	6D	As Above
10	Storage and use of flammable liquids	The unsafe storage and use of flammable liquids can cause damage to equipment and injuries to people, fires	The principal contractor or their appointed contractor should have a detailed risk assessment to reduce the high risk rating to within a lower controlled risk rating The detailed risk assessment by the contractor should be done in such a manner that the Health and Safety of persons, the safe guarding of machinery and structures are assured at all times.	H; S; E	6	E	6E	Occupational Health and Safety Act and Regulations (85 of 1993) and incorporated safety standards.
11	Stacking and storage	Unsafe stacks can cause injuries and damage to material and structure	As Above	S	6	E	6E	As Above

No.	Potential hazard	Potential risk	Controls	H-S-E Identifi-cation	S	L	Risk rating	Legal reference
12	Flame cutting and welding	Unsafe flame cutting and welding can cause: Damage to structure and equipment Injuries of disease to people	The principal contractor or their appointed contractor should have a detailed risk assessment to reduce the high risk rating to within a lower controlled risk rating The detailed risk assessment by the contractor should be done in such a manner that the Health and Safety of persons, the safe guarding of machinery and structures are assured at all times.	H; S; E	6	E	6E	Occupational Health and Safety Act and Regulations (85 of 1993) and incorporated safety standards
13	Concrete work/pouring	Truck parking or moving into wrong position falling into excavation. Concrete chute not correctly positioned Slipping and falling when trying to control vibrator Concrete load falling or bucket hitting people	As Above	S	6	E	6E	As Above
14	Work at heights	Falling objects Not hooking the safety harness to anchor point Anchor point not strong enough	As Above	S	6	E	6E	As Above

No.	Potential hazard	Potential risk	Controls	H-S-E Identifi-cation	S	L	Risk rating	Legal reference
15	Work at heights	Deliberately dropping materials or equipment Debris, building rubble falling over edges	The principal contractor or their appointed contractor should have a detailed risk assessment to reduce the high risk rating to within a lower controlled risk rating The detailed risk assessment by the contractor should be done in such a manner that the Health and Safety of persons, the safe guarding of machinery and structures are assured at all times.	S	6	E	6E	Occupational Health and Safety Act and Regulations (85 of 1993) and incorporated safety standards
16	Brickwork/Plastering/ wet trades	Stacking of bricks Incorrect levels position Faulty hand tools, poor standard of scaffolding or trestles Frames and lintels falling Use of angle grinder and brick cutting machine Insufficient space and access problems Working at height over open spaces	As Above	S	6	E	6E	As Above
17	Scaffolding	The erection, use and dismantling of scaffold can cause damage to structure and injuries to people	As Above	S	6	E	6E	As Above

No.	Potential hazard	Potential risk	Controls	H-S-E Identifi-cation	S	L	Risk rating	Legal reference
18	Electric installation	Electrocution, fires, injuries, arc eyes	The principal contractor or their appointed contractor should have a detailed risk assessment to reduce the high risk rating to within a lower controlled risk rating The detailed risk assessment by the contractor should be done in such a manner that the Health and Safety of persons, the safe guarding of machinery and structures are assured at all times.	H; S	6	E	6E	Occupational Health and Safety Act and Regulations (85 of 1993) and incorporated safety standards
19	Plumbing	Core drilling through post-tension slabs/rebar Flooding of services or electric installations Collapsing of sub-soil drainage	As Above	S	6	E	6E	As Above
18	Fire & sprinkler installation	Incorrect overhead installation, incorrect pressure testing	As Above	S	6	E	6E	As Above
19	Air-conditioning installation	Incorrect installation of ducting can cause collapse Hot works can cause fires.	As Above	S	6	E	6E	As Above
20	Ceiling installation	Incorrect use of explosive power tools Overhead dangers such as materials and tools that can fall	As Above	S	6	E	6E	As Above

No.	Potential hazard	Potential risk	Controls	H-S-E Identifi-cation	S	L	Risk rating	Legal reference
20		Improper use of PPE						
21	Electric tools	Incorrect wiring Incorrect use of equipment Person not properly trained8 Tools not inspected prior to use.	The principal contractor or their appointed contractor should have a detailed risk assessment to reduce the high risk rating to within a lower controlled risk rating The detailed risk assessment by the contractor should be done in such a manner that the Health and Safety of persons, the safe guarding of machinery and structures are assured at all times.	S	6	E	6E	Occupational Health and Safety Act and Regulations (85 of 1993) and incorporated safety standards
22	Finishing	Hand tools used incorrectly Exposure to hazardous materials, dust and inhalants Poor housekeeping causing hazards	As Above	S	6	E	6E	As Above
23	Asbestos	Can cause illnesses when insufficiently contained and controlled.	As Above	H	6	E	6E	Asbestos Regulations 2001
24	Crane operations	Crane not load tested Driver insufficiently trained Slinger not trained to an acceptable level Banks men not available / not trained.	As Above	S	6	E	6E	Occupational Health and Safety Act and Regulations (85 of 1993) and incorporated safety standards.

PART C: THE CONTRACT

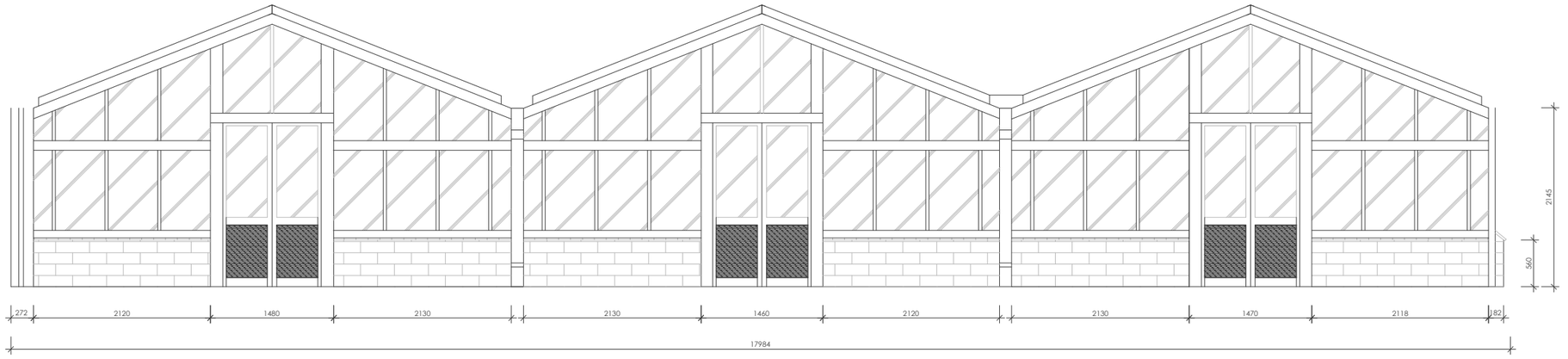
Part C3: Scope of Work

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

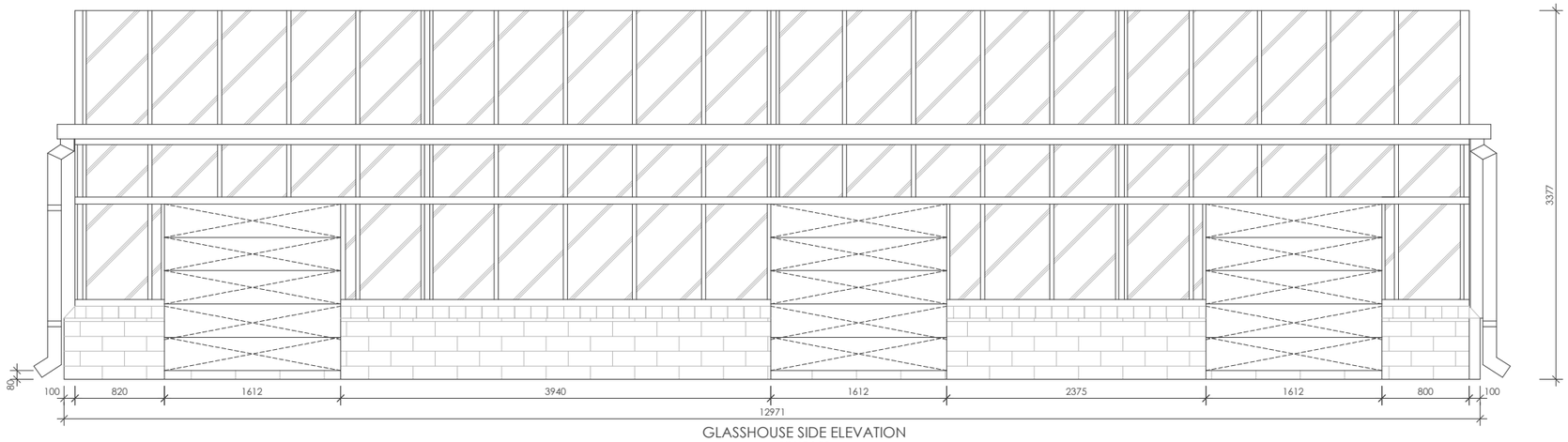
C3.3. Drawings

C3.3.1 Drawings List:

DRAWING NUMBER	DESCRIPTION
0530.9-01-01_T1	GLASS HOUSE ELEVATIONS
0530.9-01-02_T1	GLASS HOUSE TOP VIEW
0530.9-01-03_T1	GEMINATION HOUSE PLAN AND ELEVATION
0530.9-01-04_T1	MIST HOUSE PLAN AND SECTION
0530.9-02-01_T1	GLASS HOUSE IRRIGATION LAYOUT
0530.9-02-02_T1	GEMINATION HOUSE IRRIGATION LAYOUT
0530.9-02-03_T1	MIST HOUSE IRRIGATION LAYOUT
0530.9-03-01_T1	GLASS HOUSE ELECTRICAL LAYOUT



GLASSHOUSE FRONT ELEVATION
SCALE 1:30



GLASSHOUSE SIDE ELEVATION
SCALE 1:25

ISSUED FOR TENDER

No.	DATE	AMENDMENT	INIT

LEGEND

Checked by: _____

Date: _____

Approved by: _____

Date: _____

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as-built drawings

_____

certified as-built drawings as per Centralised Drawing Archive AS-BUILT DRAWING REQUIREMENTS

name: N/A

date: N/A

professional registration no.: N/A

cad file name: 0530.9-01-01_T1_GLASS HOUSE ELEVATIONS

page type: A1

client

SANBI
Biodiversity for Life
South African National Biodiversity Institute

REPUBLIC OF SOUTH AFRICA

CHIEF EXECUTIVE OFFICER
Mr SHONISANI MUNZHEDZI

consultant

VIRTUAL
CONSULTING ENGINEERS

P O BOX 323
GROENKLOOF
0027

discipline: CIVIL INFRASTRUCTURE

service

APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS

BID number: SANBI: G506/2023

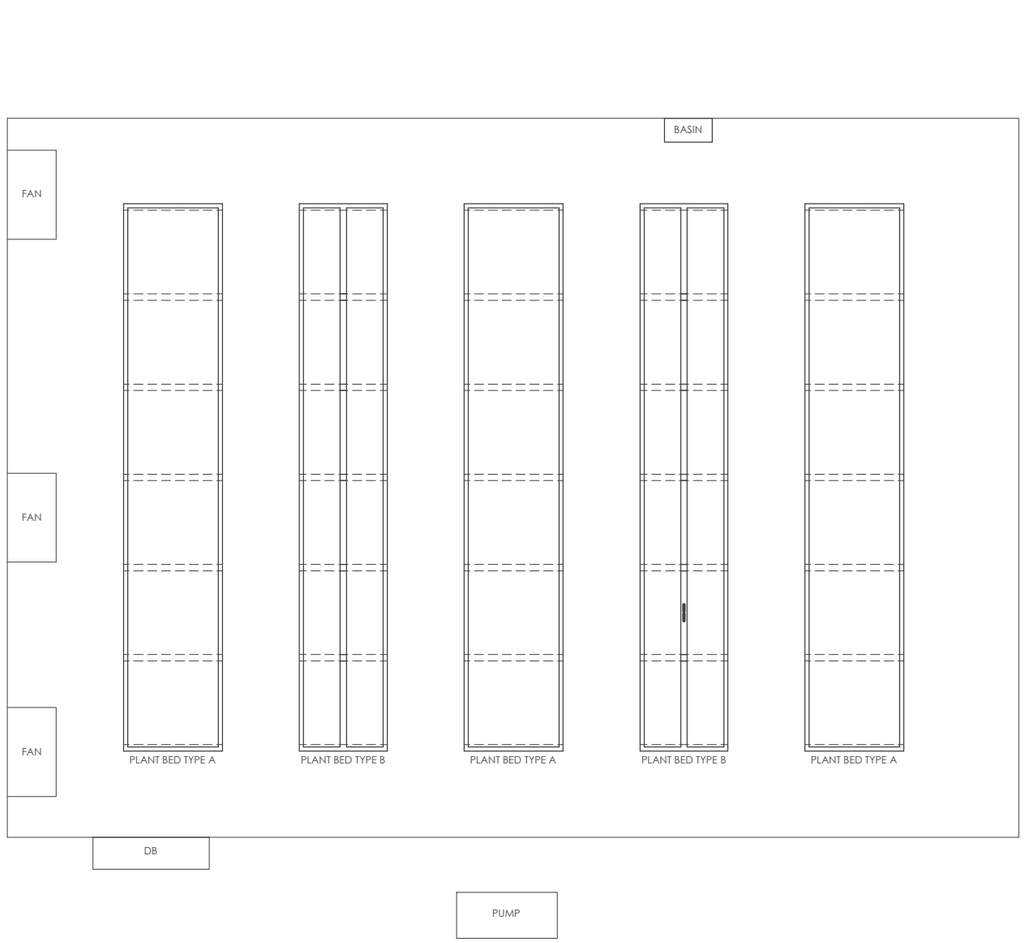
drawing title

GLASS HOUSE ELEVATIONS

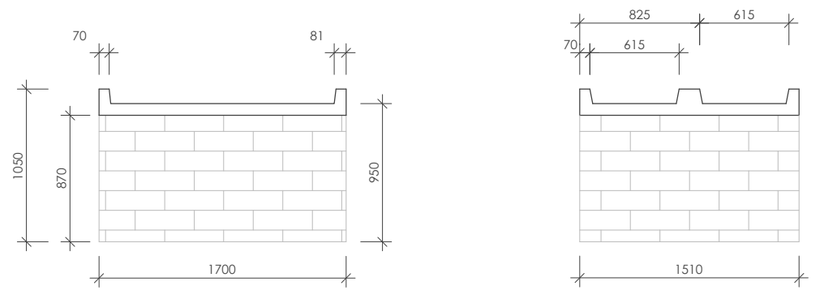
ref.no. --	designed S PHAKATHI
scale AS SHOWN	drawn L TALJAARD
date FEB '24	checked J WILSENACH

drawing number: 0530.9/01/01

revision: T1



GLASSHOUSE FLOOR LAYOUT
SCALE 1:50



GLASSHOUSE
PLANTER BOXES SECTIONS
SCALE 1:20

ISSUED FOR TENDER

No.	DATE	AMENDMENT	INIT

LEGEND

Checked by: _____

Date: _____

Approved by: _____

Date: _____

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name: N/A

date: N/A

professional registration no.: N/A

cad file name: 0530.9-01-02_T1_GLASS HOUSE TOP VIEW

page type: A1

client

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South African National Biodiversity Institute
REPUBLIC OF SOUTH AFRICA
CHIEF EXECUTIVE OFFICER
Mr SHONISANI MUNZHEDZI

consultant

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discipline: CIVIL INFRASTRUCTURE

service

APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS

BID number: SANBI: G506/2023

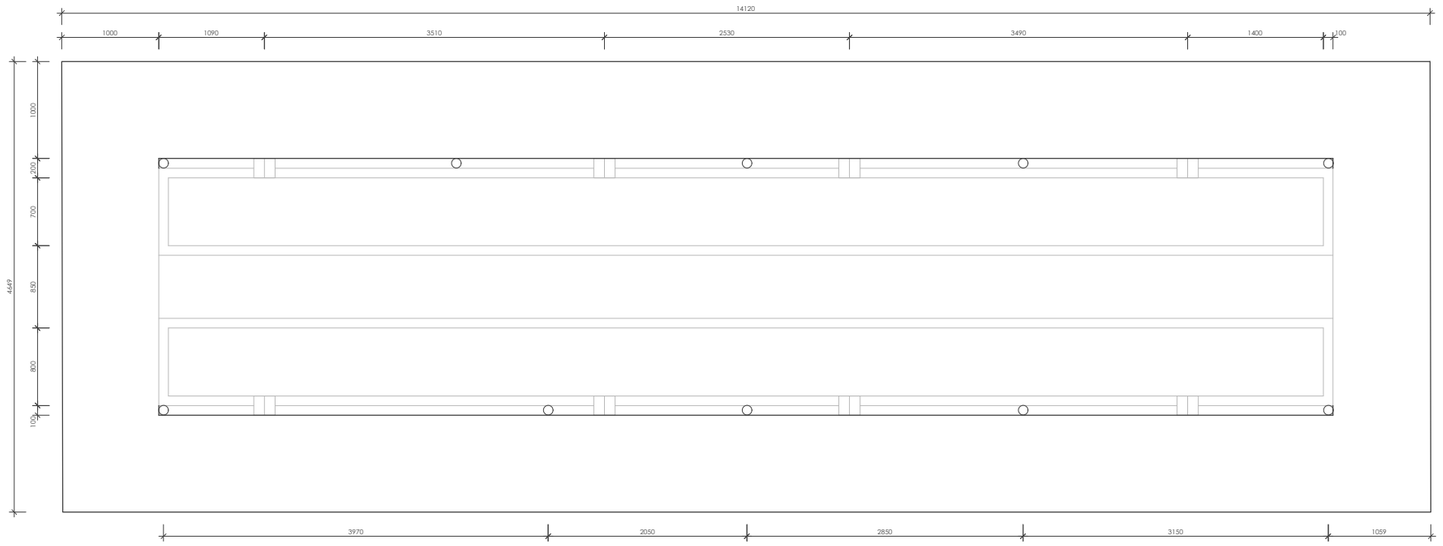
drawing title

GLASS HOUSE
FLOOR LAYOUT

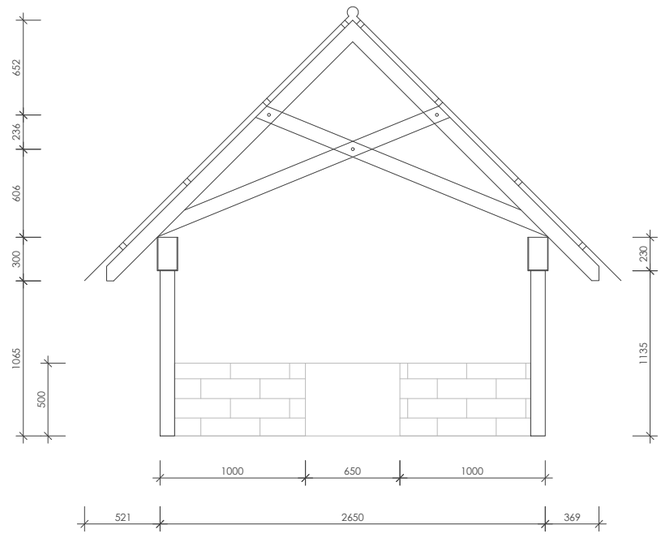
ref.no. --	designed S PHAKATHI
scale AS SHOWN	drawn L TALJAARD
date FEB '24	checked J WILSENACH

drawing number: 0530.9/01/02

revision: T1



GERMINATION HOUSE
PLAN VIEW
SCALE 1:30



GERMINATION HOUSE FRONT
ELEVATION
SCALE 1:20

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ELEVATION AND PLAN
VIEW

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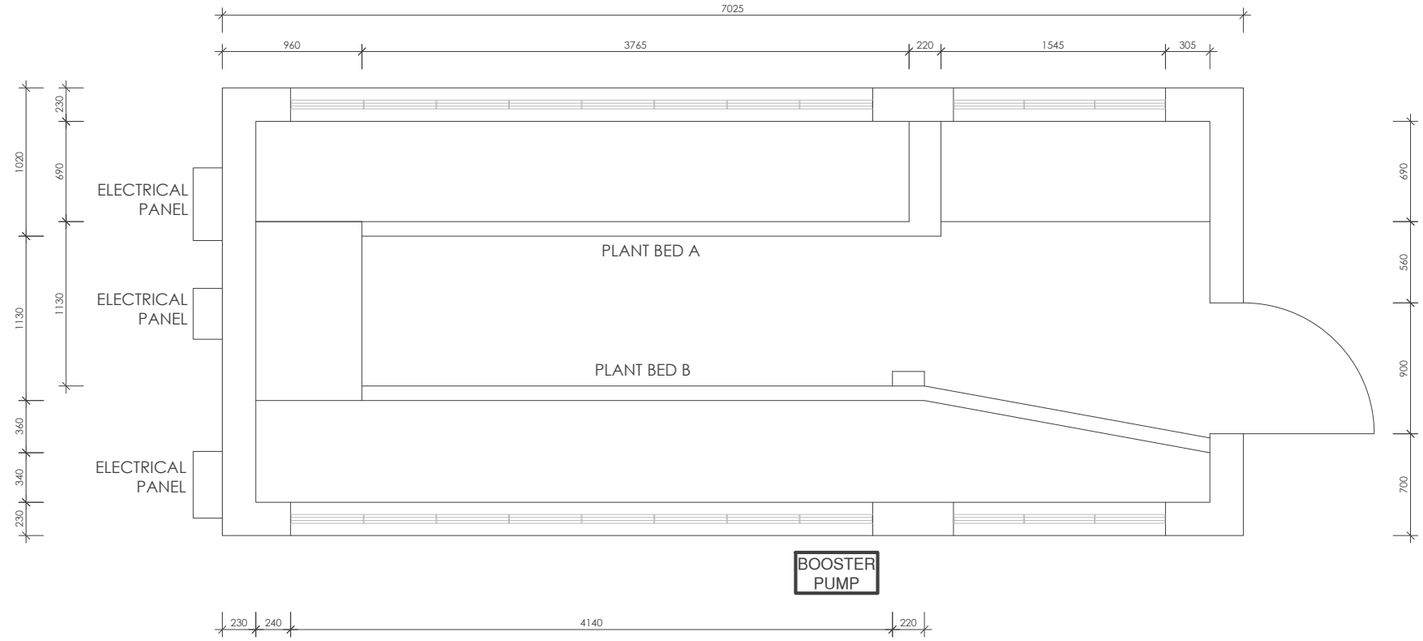
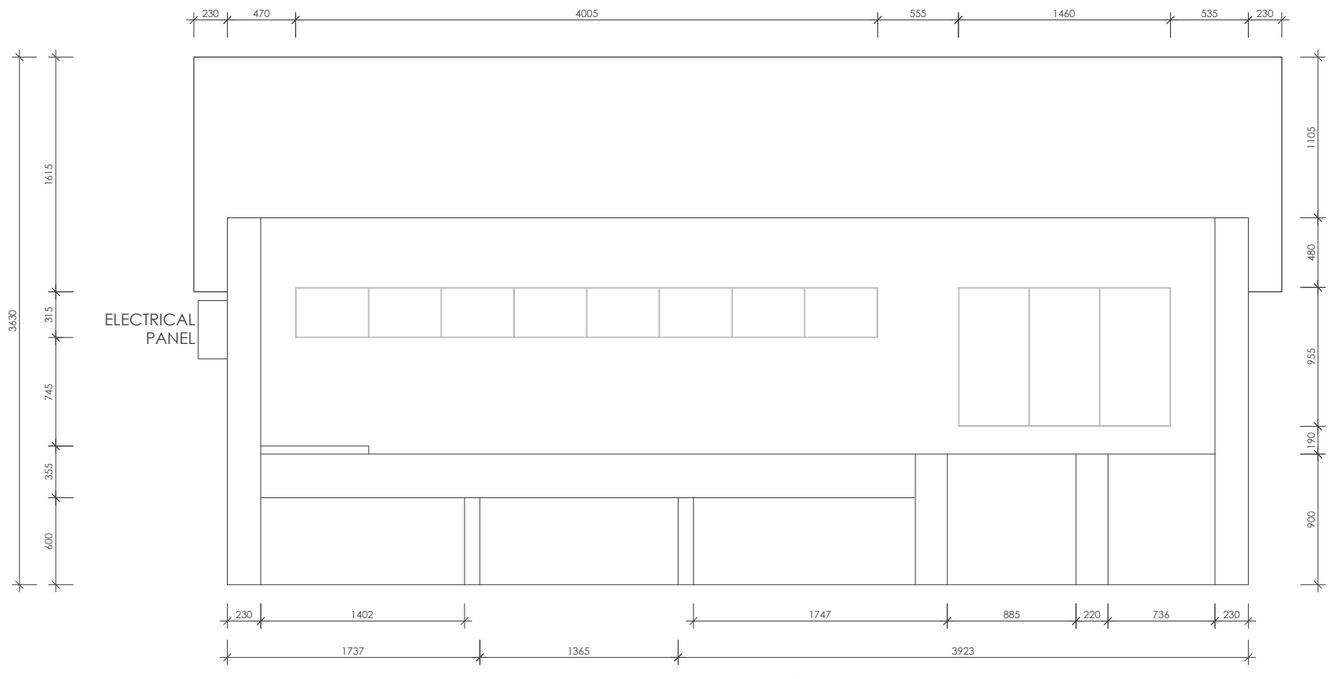


MIST HOUSE
PLAN VIEW
SCALE 1:20



MIST HOUSE
SECTION LAYOUT
SCALE 1:20

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drawing title

GERMINATION HOUSE
PLAN AND SECTION

ref.no. --	designed S PHAKATHI
scale AS SHOWN	drawn L TALJAARD
date FEB '24	checked J WILSENACH

drawing number: 0530.9/01/04

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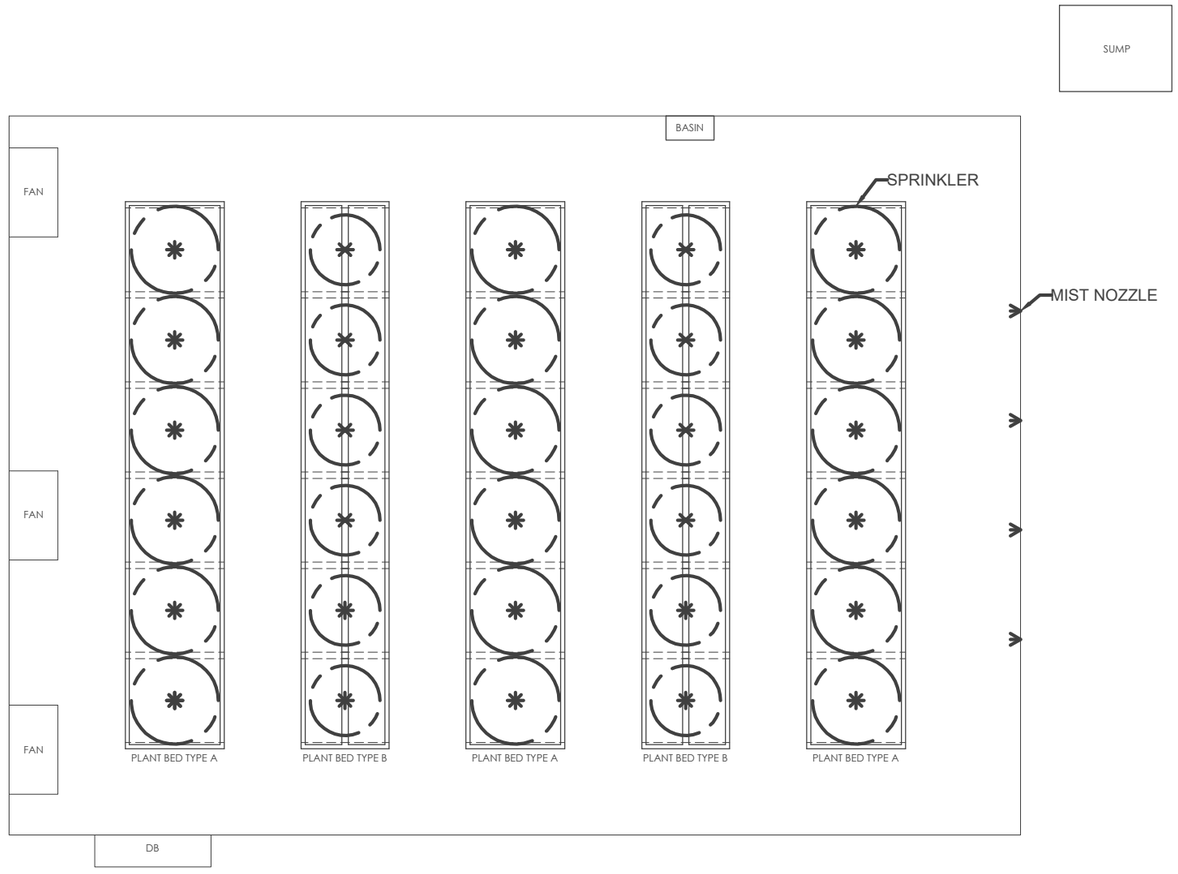

GLASSHOUSE IRRIGATION LAYOUT
SCALE 1:50

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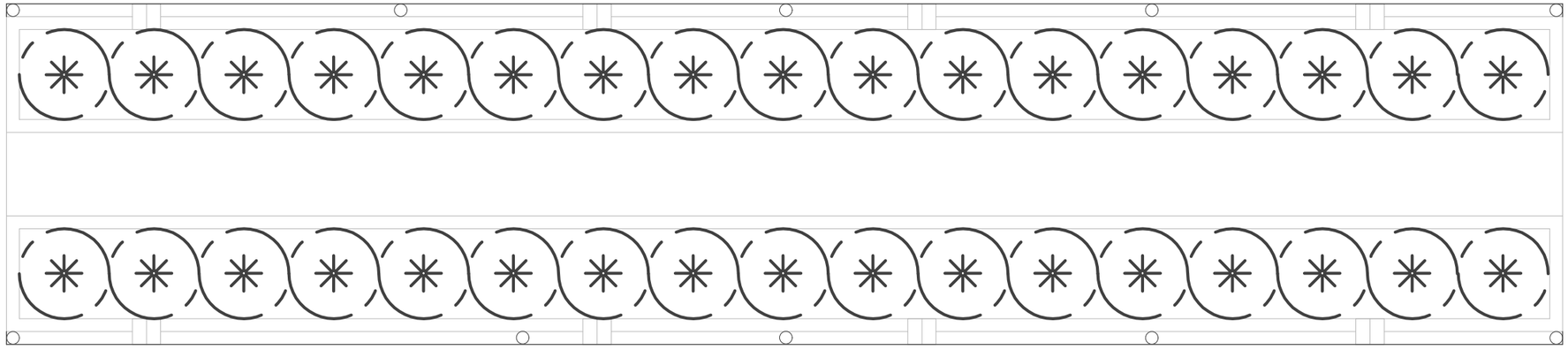

GERMINATION HOUSE
IRRIGATION LAYOUT
SCALE 1:30

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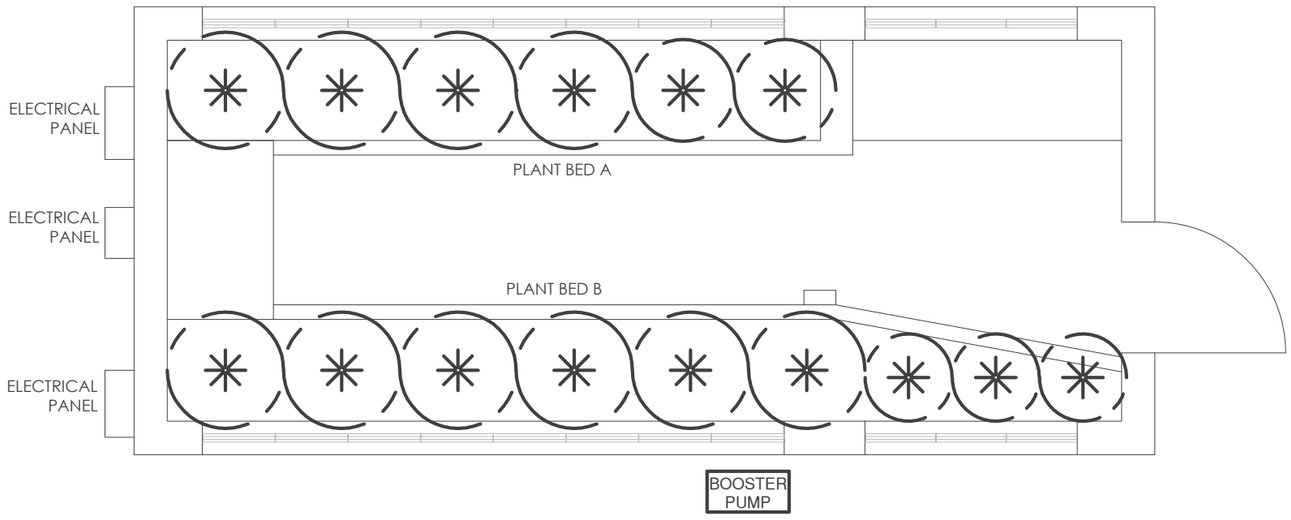

MIST HOUSE
IRRIGATION LAYOUT
SCALE 1:20

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GERMINATION HOUSE IRRIGATION LAYOUT

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scale AS SHOWN

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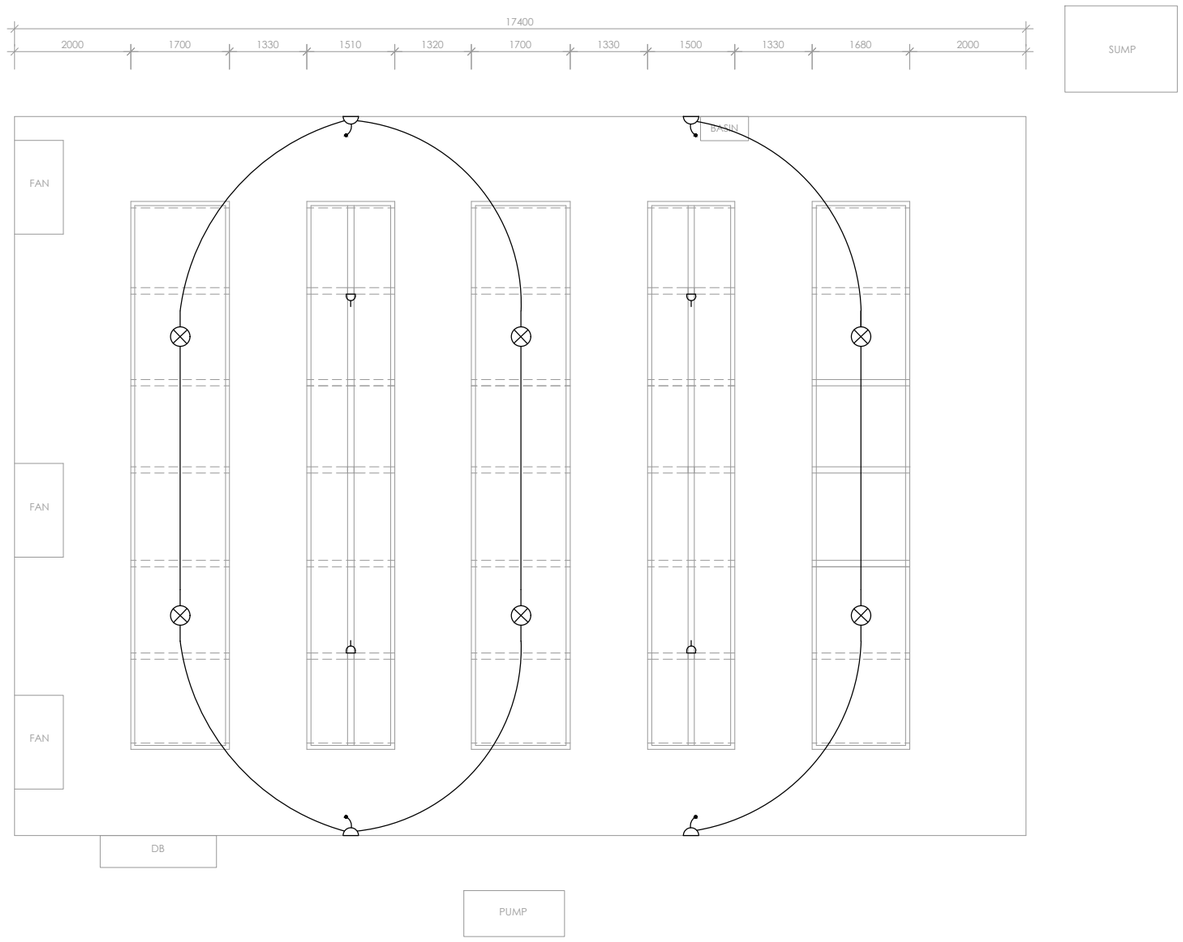

GLASSHOUSE ELECTRICAL LAYOUT
SCALE 1:50

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No.	DATE	AMENDMENT	INIT

LEGEND

- LIGHT SWITCH
- ELECTRICAL CABLES
- SINGLE LIGHT BULB LAMP
- SINGLE PHASE ISOLATOR

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professional registration no.: N/A

cad file name: 0530.9-03-01_T1_GLASS HOUSE ELECTRICAL LAYOUT

page type: A1

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APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS

BID number: SANBI: G506/2023

drawing title

GLASS HOUSE ELECTRICAL LAYOUT

ref.no. --

scale AS SHOWN

date FEB '24

designed S PHAKATHI

drawn L TALJAARD

checked JJ MALAN

drawing number: 0530.9/03/01

revision: T1

PART C: THE CONTRACT
Part C4: Scope of Work

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

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C4.2	Annexure F: Occupational Health and Safety Specification for Contractors who are on contract with SANBI	99
C4.3	Annexure G: General Environmental Specification	108

PART C: THE CONTRACT
Part C4: Site Information

PROJECT TITLE:	**APPOINTMENT OF A CONTRACTOR FOR THE REFURBISHMENT OF NURSERIES AT THE LOWVELD NATIONAL BOTANICAL GARDENS**
CONTRACT NO:	**G506/2023**

C4.1. General Site Information

Lowveld National Botanical Garden is a garden and nature reserve located at Botanical Garden Ent Road, Off Madiba Drive, Riverside, Mbombela, Mpumalanga under the City of Mbombela Municipality, as shown on Figure 1. The garden, which was founded in 1969, comprises of parts of the Nel's and Crocodile River which form separate waterfalls before converging, and an abundance of wildlife featuring 261 bird species, 75 reptile's species, hippos, Vervet Monkey and Dwarf Mongoose.

The natural vegetation of the garden is a composition of a savanna that is in between the Sour and Mixed Lowveld Bushveld, lawns, indigenous plants such as 267 woody plant species, Cycad and Clivias, and Trees like Figs and Baobabs.

FIGURE 1: LOCATION OF LOWVELD NATIONAL BOTANICAL GARDEN

C4.2. Annexure F

OCCUPATIONAL HEALTH AND SAFETY SPECIFICATIONS FOR CONTRACTORS WHO ARE ON CONTRACT WITH SANBI

C4.2.1 Scope

This specification establishes general requirements to enable SANBI and the Contractors to satisfy the requirements of Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the Construction Regulations, 2014 as amended.

The Construction Regulations, 2014, require an Employer to stop any Contractor from executing construction work which is not in accordance with the Contractor's health and safety plan for the site or which poses to be a threat to the health and safety of persons.

This specification establishes generic health and safety requirements for health and safety as stated in the scope of work associated with a contract and

- provides the overarching framework within which the Contractor is required to demonstrate compliance with certain requirements for occupation health and safety established by the Occupational Health and Safety Act of 1993;
- establishes the manner in which the Contractor is to manage the risk of health and safety incidents in the execution of the contract; and
- establishes the manner in which the Employer's health and safety agent will interact with the Contractor.

C4.2.2 Requirements

C4.2.2.1 General requirement

The Contractor shall:

- create and maintain a safe and healthy work environment,
- execute the works in a manner that complies with all the requirements of the Act and all its associated regulations, and in so doing, minimize the risk of incidents occurring; and
- respond to the notices issued by the SANBI's Health and Safety Agent as follows:
    - Improvement Notice: improve health and safety performance over time so that repeat notices are not issued;
    - Contravention Notice: rectify contravention as soon as possible;
    - Prohibition Notice: terminate affected activities with immediate effect and only recommence activities when it is safe to do so.

Any incident occurring as a result of the contractors 'negligence which may affect SANBI employees will be claimed against the contractor.

C4.2.3 Administration

C4.2.3.1 Application and Notification of intention to commence construction work

C4.2.3.1.1 Application for construction work permit

A client who intends to have construction work carried out, must at least 30 days before that work is to be carried out apply to the provincial director in writing for a construction work permit to perform construction work if the intended construction work will:

- exceed 180 days;
- will involve more than 1800 person days of construction work; or
- the works contract is of a value equal to or exceeding thirteen million rand or Construction Industry Development Board (CIDB) grading level 5.

An application must be done in a form similar to Annexure 1 in the Regulation and a site-specific number assigned by the Provincial Director must be displayed on site.

C4.2.3.1.2 Notification of construction work

A contractor who intends to carry out any construction work other than work contemplated in regulation 3(1), must at least 7 days before that work is to be carried out notify the provincial director in writing in a form similar to Annexure 2 if the intended construction work will:

- include excavation work;
- include working at a height where there is risk of falling;
- include the demolition of a structure; or
- include the use of explosives to perform construction work.

The Contractor shall ensure that no work commences on an electrical installation which requires a new supply or an increase in electricity supply before the person who supplies or contracts or agrees to supply electricity to that electrical installation has been notified of such work.

The Contractor shall ensure that no asbestos work is carried out before the Provincial Director of the Department of Labour has been notified in writing.

C4.2.3.2 Copy of the Act

The Contractor shall ensure that a copy of the Act and relevant regulations is available on site for inspection by any person engaged in any activity on the site.

Good standing with the compensation fund or a licensed compensation insurer
The Contractor shall, before commencing with any works on the site, provide the SANBI with proof of good standing with the compensation fund or with a licensed compensation insurer.

C4.2.3.3 Emergency procedures

The Contractor shall submit for acceptance to the SANBI 's Health and Safety Agent an emergency procedure which include but are not limited to fire, spills, accidents to employees, exposure to hazardous substances, which:

- identifies the key personnel who are to be notified of any emergency;
- sets out details including contact particulars of available emergency services; and
- the actions or steps which are to be taken during an emergency.

The Contractor shall within 24 hours of an emergency taking place notify the SANBI's Health and Safety Agent in writing of the emergency and briefly outline what happened and how it was dealt with.

C4.2.3.4 Health and safety file

The Contractor shall maintain on site a health and safety file which contains copies of the following;

C4.2.3.4.1 Documents required before the contractor commences with construction activities

- the Contractor's health and safety policy, signed by the chief executive officer, which outlines the Contractor's objectives and how they will be achieved and implemented by the Contractor
- the notification made to the Provincial Director of Labour, and if relevant, the notification of the person who supplies or contracts or agrees to supply electricity to that electrical installation;
- the letters of appointment, as relevant, of the construction supervisor for the site in respect of construction works covered by the Construction Regulations and the registered person responsible for the electrical installation covered by the Electrical Installations Regulations;
- a copy of the certificate of registration of the registered person responsible for the electrical installation covered by the Electrical Installations Regulations where applicable;
- the approval of the design of the part of an electrical installation which has a voltage in excess of 1 kV by a person deemed competent in terms of the Electrical Installations Regulations;
- proof of registration of the electrical contractor who undertakes the electrical installation in terms of the Electrical Installations Regulations where applicable;
- the preliminary hazard identification undertaken by a competent person;
- the organogram which outlines the roles and responsibilities of the construction supervisor's assistants and safety officers; and
- the contractor's health and safety plan;
- the emergency procedures;
- the procedure for the replacement of lost, stolen, worn or damage personal protective clothing and
- proof that the contractor is registered and in good standing with the compensation fund or with a licensed compensation insurer;

C4.2.3.4.2 Documents required after construction activities have commenced

- the letters of appointments, if relevant, of:
    - persons who are required to assist the construction supervisor;
    - safety officers;
    - health and safety representatives;
    - replacement construction supervisor, and
    - assistants of construction supervisor.
- any revisions to the organogram which outlines the roles and responsibilities of the construction supervisor's assistants and safety officers;
- each and every subcontract agreement;
- proof that every subcontractor is registered and in good standing with the compensation fund or with a licensed compensation insurer;
- proof of all subcontractor's induction training whenever it is conducted;
- copies of the minutes of the Contractor's subcontractors health and safety meetings;

- copies of each of the Contractor's subcontractors' health and safety policy, signed by the Chief executive officer, which outlines the Contractor's objectives and how the will be achieved and implemented by the Contractor;
- the health and safety plans of all the Contractor's subcontractors who are required to provide such plans;
- a comprehensive and updated list of all the subcontractors employed on site by the contractor, indicating the type of work being performed by such sub-contractors;
- the outcomes of the monthly audits for compliance with the approved health and safety plan of each and every sub-contractor working on the site;
- any report made to an inspector by the health and safety committee;
- the minutes of all health and safety meetings and any recommendations made to the Contractor by the health and safety committee;
- the findings of all audit reports made regarding the implementation of the Contractor's or a subcontractor's health and safety plan;
- the inputs of the safety officer, if any, into the health and safety plan;
- details of induction training conducted whenever it is conducted including the list of attendees;
- proof of the following where suspended platforms are used:
    - a certificate of system design issued by a professional engineer, professional certificated engineer or a professional engineering technologist;
    - proof of competency of erectors;
    - proof of compliance of operational design calculations with requirements of the system design certificate;
    - proof of performance test results;
    - sketches indicating the completed system with the operational loading capacity of the platform;
    - procedures for and records of inspections having been carried out;
    - procedures for and records of maintenance work having been carried out;
    - proof that the prescribed documentation has been forwarded to the provincial director;
- letters of appointments for competent persons to supervise the activities which law requires to be so supervised;
- A copy of risk assessments made by competent person;
- records of the register of inspections made by a competent person immediately before and during the placement of concrete or any other load on formwork;
- the names of the first aiders on site and copies of the first aid certificates of competency;
- the names of the persons the persons who are in possession of valid certificate of competency in first aid and copies of such certificates;
- details of all incidents together with the Contractor's report on such incident; and
- the record of inspections carried out by the designers of structures to ensure compliance with designs.

The health and safety file shall be made available for inspection by any inspector, subcontractor, the Project Manager, the SANBI's Health and Safety Agent or employee of the Contractor upon the request of such persons.

The Contractor shall hand over the health and safety file to the SANBI's Health and Safety Agent upon completion of the contract and if relevant, a certificate of compliance accompanied by a test report for the electrical installation in accordance with the provisions of the Electrical Installation Regulations.

C4.2.3.5 **Health and safety committee**

The Contractor shall convene health and safety meetings whenever more than two health and safety representatives have been appointed for the site. These meetings shall be attended by all health and safety representatives and persons nominated by the Contractor. Such meetings shall be convened at least once every month to:

- make recommendations to the Contractor regarding any matter affecting the health or safety of persons on the site; and
- discuss any incident on the site in which or in consequence of which any person was injured, became ill or died.

The Contractor shall consult with the health and safety committee on the development, monitoring and review of the risk assessment.

The Contractor shall ensure that minutes of the health and safety committee meetings are kept.

SANBI Health and Safety Agent shall be invited to attend such meetings as an observer.

C4.2.3.6 **Inspections, formal enquires and incidents**

The Contractor shall inform the relevant safety representative:

- beforehand of inspections, investigations or formal inquiries of which he has been notified by an inspector and
- as soon as reasonably practicable of the occurrence of an incident on the site.

The Contractor shall record all incidents and notify the SANBI's Health and Safety Agent of any incident, except in the case of a traffic accident on a public road, as soon as possible after it has occurred and reports such incidence to an inspector.

The Contractor shall investigate all incidents and issue the SANBI's Health and Safety Agent with copies of such investigations.

C4.2.3.7 **Personal protective equipment and clothing**

The Contractor shall ensure that:

- all workers are issued with the necessary personal protective clothing;
- all workers are identifiable at all times by having the company for which they work for printed on the back or front of their overalls; and
- clear procedures are in place for the replacement of lost, stolen, worn or damage personal protective clothing.

C4.2.4 Appointments

C4.2.4.1 **Health and safety representatives**

The Contractor shall appoint in writing one health and safety representative for every 50 employees working on the site, whenever there are more than 20 employees on the site, to:

- review the effectiveness of health and safety measures;
- identify potential hazards and potential major incidents;
- in collaboration with his employer, examine the causes of incidents;
- investigate complaints by any employee of the Contractor relating to that employee's health or safety on the site;
- make representations to the Contractor on matters arising from a), b), c) or d) or on general matters affecting the health or safety of the employees at the workplace;
- inspect the site with a view to, the health and safety of employees, at regular intervals;
- participate in consultations with inspectors at the workplace and accompany inspectors on inspections of the workplace; and
- participate in any internal health or safety audit.

The Contractor shall provide the health and safety representatives with the necessary assistance, facilities and training to carry out the functions established in 4.3.1

C4.2.4.2 **Appointment of construction supervisor and safety officers**

The Contractor shall, prior to commencing the work, appoint a full-time competent employee in writing as the construction supervisor for the site, with the duty of supervising the performance of the work falling within the scope of the contract and may appoint one or more competent employees to assist the appointed construction supervisor.

The Contractor may, having considered the size of the project, the degree of dangers likely to be encountered or the accumulation of hazards or risks on the site, appoint a full time or part-time construction safety officer in writing, who has in the Contractor's opinion the necessary competencies and resources, to assist the Contractor in the control of all safety related aspects on the site.

The Contractor shall compile and maintain an organogram which outlines the roles and responsibilities of the construction supervisor's assistants and safety officers.

C4.2.4.3 **Competent persons**

The Contractor shall appoint in writing competent persons to supervise or inspect, as relevant, any of the following:

- formwork and support work operations;
- excavation work;
- demolition work;
- scaffolding work operations;
- suspended platform work operations;
- material hoists;
- operation of batch plants;
- explosive power tools;
- vehicles and mobile equipment;
- fire equipment; and
- the stacking and storage of articles on the site.

The Contractor shall appoint in writing competent persons to:

- induct employees in health and safety; and
- prepare a fall protection plan.

C4.2.5 Creating and maintaining a safe and healthy work environment

C4.2.5.1 General

The Contractor shall with respect to the site and the construction works that are contemplated:

- cause a preliminary hazard identification to be performed by a competent person before commencing any physical construction activity;
- evaluate the risks associated with such work constituting a hazard to the health and safety of such employees and the steps that need to be taken to comply with the Act; and as far as is reasonably practicable, prevent the exposure of such employees to the hazards concerned or, where prevention is not reasonably practicable, minimize such exposure.

The Contractor shall ensure that:

- all reasonably practicable steps are taken to prevent the uncontrolled collapse of any new or existing structure or any part thereof, which may become unstable or is in a temporary state of weakness or instability due to the carrying out of construction work;
- no structure or part of a structure is loaded in a manner which would render it unsafe; and
- account of information, if any, provided by the designer of the structure is taken into account in the risk assessment;

Note: The information provided by the designer should outline known or anticipated dangers or hazards relating to the works and make available all information required for the safe execution of the work. It should provide as relevant, geotechnical information (or make reference to reports provided in the site information), the loading the structure is designed to withstand, the methods and sequence of construction.

The Contractor shall carry out regular inspections and audits to ensure that the works are being performed in accordance with the requirements of this specification

C4.2.5.2 Risk assessment

The Contractor shall before the commencement of any work on site and during construction work, cause a risk assessment to be performed by a competent person appointed in writing. Such an assessment shall as a minimum:

- identify the risks and hazards to which persons may be exposed to;
- analyse and evaluate the identified risks and hazards;
- document a plan of safe work procedures, including the use of any personal protective equipment or clothing and the undertaking of periodic “toolbox talks” or inductions before undertaking hazardous work, to mitigate, reduce or control the risks and hazards that have been identified;
- provide a monitoring plan; and
- provide a review plan.

C4.2.5.3 Health and safety plans

The Contractor shall prior to commencing the works to which this specification applies, submit to SANBI’s Health and Safety Agent for approval a suitable and sufficiently documented health and safety plan, based on this specification and the risk assessment that is conducted.

The health and safety plan must be specific to the current project and shall as a minimum provide:

- the information about hazards associated with the task to be performed; and
- an outline of the manner in which the Contractor intends complying with the requirements of this specification.
- The arrangements to ensure the safety of all SANBI staff affected by the activities of the project/work.
- The manner in which hazards will be communicated to all staff/including SANBI employees.

C4.2.5.4 **Responsibilities towards employees and visitors**

The Contractor shall as far as is reasonably practicable, cause every employee to be made conversant with the hazards to his health and safety attached to any work which he has to perform, any article or substance which he has to produce, process, use, handle, store or transport and any plant or machinery which he is required or permitted to use, as well as with the precautionary measures which should be taken and observed with respect to those hazards or safe work procedures. Safety for SANBI employees must be considered throughout the project life cycle.

The Contractor shall provide suitable on-site signage to alert workers and visitors to health and safety requirements. Such signage shall include but not be limited to:

- unauthorized entrance prohibited;
- signage to indicate what personal protective equipment is to be worn; and
- activity related signs.

The Contractor shall not permit any person who is or who appears to be under the influence of intoxicating liquor or drugs, to enter or remain at a workplace.

C4.2.6 Subcontractors

The Contractor may only subcontract work in terms of a written subcontract and shall only appoint a subcontractor should he be reasonably satisfied that such a subcontractor has the necessary competencies and resources to safely perform the work falling within the scope of the contract.

The Contractor shall provide any sub-contractor who is submitting a tender or appointed to perform a sub-contract falling within the scope of the contract, with the relevant sections of this specification and any work specific information which might be pertinent to the sub-contract.

C4.2.7 First aid, emergency equipment and procedures

The Contractor shall where more than five employees are employed at a workplace, provide a first aid box or boxes at or near the workplace which shall be available and accessible for the treatment of injured persons at that workplace. Such first aid boxes shall contain suitable first aid equipment.

The Contractor shall ensure that where there are more than 10 employees employed on the site that for every group of up to 50 employees at that workplace, at least one person is readily available during normal working hours, who is in possession of a valid certificate of competency in first aid.

C4.2.8 Facilities for workers

The Contractor shall provide and keep clean and fit for use at or within reasonable access of the site:

- at least one shower facility for every 15 workers

- at least one sanitary facility for every 30 workers;
- changing facilities for each sex; and
- sheltered eating areas.

2.5.4.2 A contractor shall provide reasonable and suitable living accommodation for the workers at construction sites which are remote from their homes and where adequate transportation between the site and their homes, or other suitable living accommodation, is not available

C4.2.9 Waste management

Construction will result in waste generation although in different scales depending on the nature and size of the project.
The goal for construction waste management is primarily the reduction of waste generated. Waste reduction is the responsibility of all on site, as it relates to materials procurement, handling, storage and use. Waste generated during construction will be reused, recycled or disposed to landfill.

Waste collection during building works will be appropriately managed through the staged nature of construction and the use of known quantities of materials. The majority of recyclable material that could be recovered during construction is likely to be off cuts and discards of concrete reinforcement (steel), metal off cuts, drainage pipes, telecommunication and electrical cabling, plastics, paint and timber.
No uncontrolled hazardous materials or dangerous goods will be stored on site.
Principal contractor will be required to provide waste management plan before construction work commences.

C4.2.10 Points to remember - Legal

C4.2.10.1 **Requirements**

- Application for construction work permit
- Notice of construction work
- Letter of good standing from the Department of Labour/Insurance
- Risk assessment and safe working procedures
- Appointment letter of Principal contractor and other legal appointments
- Health and safety plan
- Valid medical certificates of fitness for employees
- Fall protection plan
- Health and safety inductions.
- Notice boards and display of site-specific number assigned to the project.
- Management of plant & noise
- Management of premises
- Management of plant, labour & materials on site
- Management of safety file

C4.3. Annexure G

GENERAL ENVIRONMENTAL SPECIFICATIONS

Index to Environmental Specifications

Clause	Description
E1	Location of camp and depot
E2	Demarcation of the site
E3	Refuse
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E6	Protection of archaeological and palaeontological Sites
E7	Effluent and storm-water management
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E9	Discharge of construction water
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E14	Materials use, handling, storage and transport
E15	Use of cement/concrete
E16	Fuel storage and use
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E19	Fire
E20	Removal of topsoil
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E22	Site Rehabilitation
E23	Landscaping and preparation for re-vegetation

E1 Location of camp and depot

The Contractor's Camp and Materials Storage Area shall be located at a position approved by the Responsible Person. No site staff other than security personnel shall be housed on site. The Contractor's Camp and Materials Storage Area shall be kept neat and tidy and free of litter.

E2 Demarcation of the site

It is important that activities are conducted within a limited area to facilitate control and to minimise the impact on the existing natural environment, existing tenants and other construction activities in the vicinity and public thoroughfares.

The Contractor shall demarcate the boundaries of the site in order to restrict his construction activities to the site. The method of demarcation and the location of the demarcated area shall be determined by the Contractor and approved by the Responsible Person before any work being undertaken. The Contractor shall ensure that all plant, labour and materials remain within the boundaries of the site. Failure to do so may result in the Contractor being required to fence the boundaries of the site at his/her own expense to the satisfaction of the Responsible Person.

If additional areas (e.g. for lay down, rest areas) are required, these must be approved in writing by the Responsible Person. The Contractor is advised that it may take approximately one week to obtain such permission from the Responsible Person.

Suitable temporary fencing may need to be erected during construction to minimise the risk of injury to the public, and animals.

E3 Refuse

Refuse refers to all solid waste, including construction debris (e.g. wrapping materials, timber, cans etc.) waste and surplus food, food packaging etc.

The Contractor shall institute an on-site waste management system that is acceptable to the Responsible Person to prevent the spread of refuse within and beyond the site. The Contractor is reminded that wind velocities on the construction site can be high.

All waste shall be collected and contained immediately. The Contractor shall institute a weekly clean up of the site if so instructed by the Responsible Person. This daily/weekly clean up shall be for the Contractor's account.

The Contractor shall not dispose of any waste and/or construction debris by burning or burying. The use of waste bins and skips is recommended. The bins shall be provided with lids and an external closing mechanism to prevent their contents from blowing out. The Contractor shall ensure that all waste is deposited by his employees in the waste bins for removal by the Contractor. Bins shall not be used for any purposes other than waste collection and shall be emptied on a regular basis. All waste shall be disposed of off-site at approved landfill sites.

Hazardous waste, including waste oil and other chemicals (e.g. paints, solvents) shall be stored in (an) enclosed area(s), and shall be clearly marked. If deemed necessary by the Responsible Person, the Contractor shall obtain the advice of a specialist waste expert concerning the storage of hazardous waste. Such waste shall be disposed of off-site by a specialist waste contractor, at a permitted hazardous waste disposal site.

E4 Protection of fauna and flora

All fauna within and around the site shall be protected. Birds and animals shall not be caught or killed by any means, including poisoning, trapping, shooting or setting of snares. Offenders may be prosecuted in terms of the Animals Protection Act 71 of 1962.

E5 Defacement of natural features

Defacement of any features outside of the construction site shall not occur without the prior written permission of the Responsible Person. Any features defaced by the Contractor shall be restored to the satisfaction of the Responsible Person.

E6 Protection of archaeological and palaeontological sites

If any possible palaeontological /archaeological material is found during excavations, the Contractor shall stop work immediately and inform the Responsible Person. The Responsible person will inform the South African Heritage Resource Agency (SAHRA) and arrange for a palaeontologist/archaeologist to inspect, and if necessary, excavate the material, subject to acquiring the requisite permits from the National Monuments Council. Costs incurred will be for the Employer's account.

E7 Effluent and storm-water management

The Contractor must ensure that pollution of the ground or surface water does not occur as a result of site activities. Pollution could result from the accidental release of contaminated run-off from construction camps, discharge of contaminated construction water, chemicals, oils, fuels, sewage, run-off from stockpiles, solid waste, litter, etc.

E8 Run off from construction camps

The Contractor shall ensure that polluted run-off (excluding silt "pollution"), such as run-off from construction camps where equipment is cleaned and/or serviced, fuel stores, workshops, etc. is not discharged overland. The Contractor shall erect an earth/brick berm 0,5 m high around such areas and shall collect all run-off from these areas and store it in a conservancy tank for removal from the site. The Contractor shall ensure that silt-laden water is not discharged directly into any surface watercourses (i.e. vlei's, etc.), and shall take suitable measures to prevent this.

Natural run-off shall be diverted away from any camps towards the storm-water drains where these are available. Special care must be taken in areas susceptible to erosion, e.g. steep slopes. The Contractor shall ensure that excessive quantities of sand, silt and silt-laden water do not enter the storm-water drain system, or any surface watercourse. The Contractor shall take appropriate measures, e.g. the erection of silt traps, or drainage retention areas, to prevent silt and sand entering drainage or watercourses. Any partial or complete blockage of the storm-water drainage system shall be cleared by the Contractor at his / her own expense.

E9 Discharge of construction water

Construction water refers to all water dirtied as a result of construction activities.

The Contractor may discharge silt laden water overland and allow this water to filter into the ground. However, s/he shall ensure that he does not cause erosion as a result of any overland discharge.

The Contractor may not discharge cement-laden water overland, i.e. washings from trowels, wheelbarrows and the like.

Trucks delivering concrete shall not wash the trucks or the chutes on the site. All washing operations shall take place off site at a location where wastewater can be disposed of in the correct manner.

E10 Servicing/fuelling of construction equipment

Servicing and fuelling should preferably occur off site.

However, if these activities occur on site, the Contractor shall ensure that all servicing of vehicles and equipment takes place in designated areas agreed upon by the Responsible Person. All waste shall be collected and disposed of off-site at an appropriately licensed landfill site. All equipment that leaks onto the ground shall be repaired immediately or removed.

Similarly, no vehicles or machines shall be refuelled on site except at designated refuelling locations, unless otherwise agreed with the Responsible Person. The Contractor shall not change oil or lubricants anywhere on site except at designated locations, except if there is a breakdown or an emergency repair.

In such instances, the Contractor shall ensure that he has Drizit pads (or equivalent) and/or drip trays available to collect any oil, fluid, etc.

E11 Fuels and chemicals

The Contractor shall take all reasonable precautions to prevent the pollution of the ground and/or water resources by fuels and chemicals as a result of his activities.

The Contractor shall keep the necessary materials and equipment on site to deal with ground spills of any of the materials used or stored on site.

The Contractor shall ensure that no oil, petrol, diesel, etc. is discharged onto the ground. Pumps and other machinery requiring oil, diesel, which is intended to remain in one position for longer than two days shall be placed on drip trays. The drip trays shall be emptied regularly, and the contaminated water disposed of off-site at a facility capable of handling such wastewater. Drip trays shall be cleaned before any possible rain events that may result in the drip trays overflowing, and before long weekends and holidays.

The Contractor shall remove all oil-, petrol-, and diesel-soaked sand immediately and shall dispose of it as hazardous waste.

Should the Responsible Person/ECO and/or the relevant authorities deem it necessary to institute a programme for the removal of contaminated ground resulting from the non-compliance of the controls detailed above, these costs will be for the Contractor's account. Remedial action shall be approved by the ECO and relevant authorities, if appropriate.

E12 Dust control

The Contractor shall be responsible for the continued control of dust arising from his/her operations, through measures including, but not limited to, spraying of water on bare areas, rotovating straw bales into the soil surface and the scheduling of dust-generating activities to times when wind velocity is low. Overhead sprayers shall not be used in windy conditions, due to water loss through evaporation. The use of water carts is preferred.

The Contractor shall inform the Responsible Person 48 hours in advance of anticipated “unavoidable” dust-generating activities. The Responsible Person and/or ECO may inform adjacent land users, tenants and communities about the possibility of dust pollution, and the approximate duration of the problem.

E13 Noise control

The Contractor shall take all reasonable precautions to minimise noise generated on site as a result of his operations, especially when working in areas or on activities that may impact on neighbouring land users.

The Contractor shall comply with the applicable regulations with regard to noise.

The Contractor shall inform the Responsible Person 48-hours in advance of anticipated “unavoidable” noise-generating activities. The Responsible Person and/or Environmental Officer may inform adjacent land users, tenants and communities about the possibility of noise pollution and the approximate duration of the problem.

E14 Materials use, handling, storage and transport

Procedure for material handling must be discussed with and approved by the Responsible Person prior to commencement of this activity.

E15 Use of cement/concrete

The Contractor is advised that cement and concrete are regarded as highly hazardous to the natural environment on account of the very high pH of the material, and the chemicals contained therein. Therefore, the Contractor shall ensure that:

- concrete is mixed on mortar boards, and not directly on the ground;
- visible remains of concrete, either solid, or from washings, are physically removed immediately and disposed of as waste. Washing visible signs into the ground is not acceptable; and
- all aggregate is also removed.

E16 Fuel storage and use

Tanks containing fuels shall have lids and shall remain firmly shut. Only clean, empty tanks may be stored on the bare ground. Fuel stores shall be placed on a bunded sealed base - the bunds shall have a volume of 110% of the volume of the largest tank in the storage area. Any waste-water or spilled fuel collected within the bund shall be disposed of as hazardous waste.

The Contractor shall take all the necessary precautions to prevent fires or spills. No smoking shall be allowed in the vicinity of the fuel stores. Failure to adhere to this specification shall be cause for a spot fine being imposed on the offender.

The Contractor shall ensure that there is adequate fire-fighting equipment at the fuel stores.

E17 Hazardous materials

The Contractor shall comply with all relevant national, regional and local legislation with regard to the transport, use and disposal of hazardous materials. If necessary, the Contractor shall obtain the advice of the manufacturer with regard to the safe handling of hazardous materials. Any claims against the Contractor shall be for his/her account.

The Contractor shall provide the Responsible Person with a list of hazardous substances on site, together with storage procedures for these materials.

The Contractor shall ensure that there is an emergency procedure to deal with accidents and incidents (e.g. spills) arising from hazardous substances. The Contractor shall report major incidents (spills in excess of 50 litres) to the Responsible Person immediately.

The Contractor shall maintain a register of spills or incidents involving hazardous materials, as well as measures taken.

The Contractor shall ensure that information on all hazardous substances is available to all personnel on site. The Contractor shall furthermore be responsible for the training of all personnel on site who will be handling the material about its proper use, handling and disposal.

E18 Transport of materials outside the site

The Contractor shall comply with all the applicable local, regional and national by-laws with regard to road safety and the transport of materials, especially hazardous and/or toxic materials. Any claims against the Contractor shall be for his account.

The Responsible Person shall provide the Environmental Officer with a schedule of the proposed transportation of significant quantities of hazardous material onto the site, before commencing work on site. The Environmental Officer may request further details or notifications of specific material movements if considered necessary.

E19 Fire

The Contractor shall take all the necessary precautions to ensure that fires are not started as a result of his/her activities on site, and shall also comply with the requirements of the Occupational Health and Safety Act 85 of 1993.

No open fires shall be permitted on or off site. Closed fires or stoves shall only be permitted at designated safe sites in the construction camps. Fires shall also not be permitted near any potential sources of combustion, such as fuel stores, stockpiles of plant material etc.

The Contractor is advised that sparks generated during welding, cutting of metal or gas cutting can cause fires. Every possible precaution shall therefore be taken when working with this equipment near potential sources of combustion. Such precautions include having an approved fire extinguisher immediately available at the site of any such activities.

The Contractor shall be liable for any expenses incurred by any organisations called to assist with fighting fires, and for any costs relating to the rehabilitation of burnt areas.

E20 Removal of topsoil

Following removal of vegetation from the site, all topsoil shall be removed (up to a maximum of 30-cm depth) and stock-piled for re-use in subsequent rehabilitation and landscaping activities. The stockpiles shall not be higher than 2-m in order to minimise composting. The stockpiles of topsoil shall be located in an area agreed with the Responsible Person.

E21 Stabilisation of steep slopes

The disturbance of steep slopes, for example by the removal of vegetation, may result in slope instability and erosion by rain and surface run off. The Contractor shall ensure that slopes that are disturbed during construction are stabilised to prevent erosion occurring. Where re-vegetation of slopes is undertaken, this shall be in accordance with the specification provided in EP6.

Slopes that are susceptible to accidental damage during construction shall be protected to reduce the risk of disturbance.

Any erosion that does occur must be reinstated at the Contractor's cost.

E22 Site rehabilitation

The Contractor shall be responsible for rehabilitating any areas cleared or disturbed for construction purposes that are to be incorporated into open space or buffer zones. The Contractor shall re-vegetate such areas in accordance with the specification provided below.

The Contractor shall stabilise, by straw rot ovation or other means, any areas that are cleared or disturbed for construction purposes which are not going to be incorporated into open space or buffer zones (i.e. areas that will be subsequently developed by another party).

All construction equipment and excess aggregate, gravel, stone, concrete, bricks, temporary fencing and the like shall be removed from the site upon completion of the work. No discarded materials of whatsoever nature shall be buried on the site or on any other land not owned by ACSA.

E23 Landscaping and preparation for re-vegetation

Areas that require reshaping shall be cut, filled and compacted so as to follow the contours of the surrounding landscape. Topsoil removed from the area initially shall be replaced. Care must be taken not to mix the topsoil with the subsoil during shaping operations. Should a crust form on the soil before re-vegetation is commenced, the Contractor shall, at his own cost, loosen the crust by scarifying to a depth of 150 mm.