

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract
Contract: **SANBI G550/2025**



SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE (SANBI)

Contract No: G550/2025

**REQUEST FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK
TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY
AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION CONTRACT**

PROCUREMENT DOCUMENT

JULY 2025

Issued by:

South African National Biodiversity Institute
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0184
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Prepared by:

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Name of tenderer:

Address:

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

Email:

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PART T: THE TENDER
Part T1: Tendering Procedures

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
CONTRACT NO:	SANBI: G550/2025

Advertising date:	22 July 2025	Closing date:	13 August 2025
Closing time:	11:00	Validity period:	90 Days

T1.1 Tender Notice and Invitation to Tender

THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE INVITES TENDERERS FOR THE PROVISION OF:

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Project.

It is estimated that tenderers should have a CIDB contractor grading of **4GB** or higher.

Tender documents will be available as from **22 July 2025** and will be available **ONLINE ONLY** on:

- SANBI website www.sanbi.org.za (click on "Opportunities")
- CIDB Website
- National e-Tender Publication Portal

A compulsory briefing session will take place on site on **31 July 2025 at 11:00** in the Old Mutual Conference Centre (OMCC) at the Kirstenbosch National Botanical Garden. Bidders are encouraged to direct all technical and bidding procedure enquiries to the email address below.

Bidders are encouraged to direct all technical and bidding procedure enquiries to the email address below.

Department: Supply Chain Management
Email: sanbi.tenders@sanbi.org.za
Cc: shahien@virtualconsulting.co.za and A.Hendricks@sanbi.org.za
Cut-off date for enquiries: **5 August 2025**

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 Shahien Ishmail Virtual Consulting Engineers VCE (Pty) Ltd shahien@virtualconsulting.co.za
SANBI SCM Representative	sanbi.tenders@sanbi.org.za

The closing time and date for the receipt of tenders is **11:00** on **13 August 2025**.

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: THE TENDER
Part T1: Tendering Procedures

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
CONTRACT NO:	SANBI G550/2025

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.1.1.1	<p>The Employer is: South African National Biodiversity Institute (SANBI):</p> <p>The Employer's domicilium citandi et executandi (permanent physical business address) is: Pretoria National Botanical Garden 2 Cussonia Avenue, Biodiversity Centre Brummeria, Pretoria</p> <p>The Employer's address for communication relating to this project is: Private Bag X101 Silverton 0184</p>
C.1.2	<p>The Tender Documents issued by the Employer comprise the following documents:</p> <p>PART T: THE TENDER 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</p> <p>PART C: THE CONTRACT Part C1: Agreements and Contract data C1.1 - Form of offer and acceptance C1.2 - Contract data C1.3 - Construction guarantee C1.4 - Occupational Health & Safety Agreement 37(2) Part C2: Pricing Data C2.1 - Pricing Instructions C2.2 - Bill of Quantities</p>

Clause number	Tender Data
	<p>Part C3: Scope of Works C3.1 - Description of the works C3.2 - Construction</p> <p>Part C4: Site Information C4.1 - Site location</p> <p>Appendices Appendix A – Technical and Health & Safety Specification Appendix B – Drawings</p>
C.1.4	<p>The employer's agent is:</p> <p>Virtual Consulting Engineers VCE (PTY) LTD Contact Person: Shahien Ishmail Tel: 021 685 0789 / 082 084 5835 Fax: 086 655 2690 E-mail: shahien@virtualconsulting.co.za</p>
C.2.1	<p>Only those tenderers who satisfy the following eligibility criteria are eligible to submit tenders 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.</p> <p>(a) CIBD registration Only those tenderers who are registered with the CIBD, 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 4GB class of construction work, are eligible to have their tenders evaluated.</p> <p>Joint ventures are eligible to submit tenders provided that:</p> <ol style="list-style-type: none"> every member of the joint venture is registered with the CIBD; the lead partner has a contractor grading designation in the 4GB 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 4GB class of construction work or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations. <p>(b) National Treasury Central Supplier Database Tenderers who are not registered on the National Treasury Central Supplier Database at close of tender, shall submit a copy of their application of registration, with their tender submission. Tenders received from such tenderers who have not submitted proof of their registration within 21 days after the closing date for tender submissions, will not be considered.</p>
C.2.6	<p>Failure to apply instructions contained in addenda may render a tenderer's offer non-responsive in terms of clause C.3.8.</p>
C.2.7	<p>The arrangements for a compulsory clarification meeting are as stated in the Tender Notice and Invitation to Tender.</p>

Clause number	Tender Data
	Tenderers must sign the attendance list in the name of the tendering entity. Addenda will be issued to and tenders will be received only from those tendering entities appearing on the attendance list
C.2.8	Request clarifications at least 7 working days before the closing time.
C.2.12	<p>Main tender offers are required to be submitted together with alternative tenders.</p> <p>If a tenderer wishes to submit an alternative tender offer, the only criteria permitted for such alternative tender offer is that it demonstrably satisfies the Employer's standards and requirements, the details of which may be obtained from the Employer's Agent.</p> <p>Calculations, drawings and all other pertinent technical information and characteristics as well as modified or proposed Pricing Data must be submitted with the alternative tender offer to enable the Employer to evaluate the efficacy of the alternative and its principal elements, to take a view on the degree to which the alternative complies with the Employer's standards and requirements and to evaluate the acceptability of the pricing proposals. Calculations must be set out in a clear and logical sequence and must clearly reflect all design assumptions. Pricing Data must reflect all assumptions in the development of the pricing proposal.</p> <p>Acceptance of an alternative tender offer will mean acceptance in principle of the offer. It will be an obligation of the contract for the tenderer, in the event that the alternative is accepted, to accept full responsibility and liability that the alternative offer complies in all respects with the Employer's standards and requirements.</p> <p>The modified Pricing Data must include an amount equal to 5% of the amount tendered for the alternative offer to cover the Employer's costs in confirming the acceptability of the detailed design.</p>
C.2.13.6	A two-envelope procedure will be followed as described in clause C.2.13.7.
C.2.13.7	<p>Tenderers shall note the specific requirements for packaging of their tender documents and include only the following:</p> <p>Two (2) original documents marked original: Document A "FINANCIAL ENVELOPE and Original document B "TECHNICAL ENVELOPE".</p> <ul style="list-style-type: none"> • Original Document A "FINANCIAL ENVELOPE" pack of original documents with Pricing included e.g. Form of Offer and Acceptance, bill of quantities, costing models and cash flows. • "Original document B "TECHNICAL ENVELOPE" pack of original documents excluding pricing e.g. Form of Offer and Acceptance, bill of quantities, costing models and cash flows and a Memory Stick with a Copy of "Original Document B" TECHNICAL ENVELOPE excluding pricing e.g. Form of Offer and Acceptance, bill of quantities, costing models and cash flows. <p>Financial or pricing details should ONLY be included in the envelope marked original document "A FINANCIAL ENVELOPE".</p> <p>NB: Failure to submit in the prescribed manner WILL lead to the bid being disqualified. The Service Provider is to ensure that the provided USB includes the proposal, is readable and is not corrupt. Failure to comply will lead to the bid being considered non-responsive. Please put the memory stick in the "Original Document B" TECHNICAL ENVELOPE (original document and memory stick in one envelope).</p>

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

Clause number	Tender Data
	<p>INCLUSION OF ANY PRICING INFORMATION ANYWHERE ON THE MEMORY STICK WILL LEAD TO THE BID BEING DISQUALIFIED.</p> <p>The original document and the memory stick will be placed in one envelope and on the envelope sealed bearing the following:</p> <ul style="list-style-type: none"> • 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
C.2.13.9	Telephonic, telegraphic, telex, facsimile or e-mailed tender offers will not be accepted.
C.2.15.1	<p>The Employer's address for delivery of tender offers and identification details to be shown on each tender offer package are:</p> <p>Location of Tender box: Biodiversity Centre</p> <p>Physical address: Pretoria National Botanical Garden 2 Cussonia Avenue Brummeria Pretoria</p> <p>Identification details: Tender number: SANBI: G550/2025</p> <p>Title of Tender: Requests for Bids for The Appointment of a Contractor for The Renovation Work to The Goldfields Education Centre for The South African National Biodiversity Institute at The Kirstenbosch National Botanical Garden, Cape Town: Completion Project</p>
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 .
C.2.16.3	<p>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:</p> <ol style="list-style-type: none"> (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, C.2.18 or C.3.9 <p>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</p>
C.2.18	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.
C.2.22	Tender Documents will not be returned to bidders

Clause number	Tender Data
C.2.23	<p>The tenderer is required to submit with his tender following (failure to provide below documentation will result in the tender being rejected):</p> <ol style="list-style-type: none"> 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) The signed compulsory site briefing certificate. 6) Plant Documentation: Equipment owned by Contractor: registration documents must be provided. or Equipment to be rented (if any): letter of intent to hire with preferred rental companies (registration documents must be attached) 7) A professional Construction Health & Safety Officer with more than 5 years' experience with a Valid Professional Registration with SACPCMP. CV for proposed professional CHS Officer indicating: <ul style="list-style-type: none"> • Previous work experience of similar projects in the last five years • Total number of years' working experience in construction • Certified copies of Qualifications or artisan's certification or other recognised training courses completed
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.3.4.1	The tenders will not be opened in public
C.3.5.1	Follow procedure as described in clause C.2.13.7
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	<p>In addition to the requirements of the Condition of Tender, offers will only be accepted if:</p> <ol style="list-style-type: none"> 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.

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

Clause number	Tender Data
	<p>g) A copy of Tax Compliance Status Pin or Tax compliant CSD report.</p> <p>h) Plant Documentation: Equipment owned by Contractor: registration documents must be provided. or Equipment to be rented (if any): letter of intent to hire with preferred rental companies (registration documents must be attached)</p> <p>i) A professional Construction Health & Safety Officer with more than 5 years' experience with a Valid Professional Registration with SACPCMP.</p> <p>CV for proposed professional CHS Officer indicating:</p> <ul style="list-style-type: none">• Previous work experience of similar projects in the last five years• Total number of years' working experience in construction• Certified copies of Qualifications or artisan's certification or other recognised training courses completed

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 tender's 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 tenders 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.

FUNCTIONALITY CRITERIA		
ID	CRITERIA	POINTS
	Implementation method and project plan or programme	25
	(a) Project methodology	
1	<ul style="list-style-type: none"> • Method to be followed in delivering this project, the methodology and approach must be specific to the project and location of works (this should include the PMBOK knowledge areas as well as all relevant project life cycle stages). • A team organogram of the people who will be working on the project. • Time and quality management of the project. • 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><tr><td>No Methodology</td><td>0</td></tr><tr><td>Poor Methodology</td><td>3</td></tr><tr><td>Average Methodology</td><td>6</td></tr><tr><td>Above Average Methodology</td><td>9</td></tr><tr><td>Good Methodology</td><td>12</td></tr><tr><td>Comprehensive (Exceptional) Methodology</td><td>15</td></tr></table> <p>(15)</p> <p>(b) Weekly plan/programme with milestones</p> <ul style="list-style-type: none">• The programme should indicate the sequence of work execution.• Milestones and resources linked to the activity.• It should be practical, realistic and include all activities linked to the project. <table><tr><th>Sub-Criteria</th><th>Points</th></tr><tr><td>No Programme</td><td>0</td></tr><tr><td>Poor Programme</td><td>2</td></tr><tr><td>Average Programme</td><td>4</td></tr><tr><td>Above Average Programme</td><td>6</td></tr><tr><td>Good Programme</td><td>8</td></tr><tr><td>Comprehensive (Exceptional) Programme</td><td>10</td></tr></table> <p>(10)</p> <p>Note: Bidders must take cognisance of the weather measurements recorded for the last 10 years – Refer site information Section C4.1.2</p>	Sub-Criteria	Points	No Methodology	0	Poor Methodology	3	Average Methodology	6	Above Average Methodology	9	Good Methodology	12	Comprehensive (Exceptional) Methodology	15	Sub-Criteria	Points	No Programme	0	Poor Programme	2	Average Programme	4	Above Average Programme	6	Good Programme	8	Comprehensive (Exceptional) Programme	10	
Sub-Criteria	Points																													
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2	<p>Contractor's Experience</p> <ul style="list-style-type: none">• Three relevant reference letters regarding work of similar scope and scale completed in the last ten (10) years <table><tr><th>Sub-Criteria</th><th>Points</th></tr><tr><td>One relevant reference letter</td><td>5</td></tr><tr><td>Two relevant reference letters</td><td>10</td></tr><tr><td>Three relevant reference letters or more</td><td>15</td></tr></table> <p>(15)</p> <ul style="list-style-type: none">• List of at least three General Building projects with appointment letters, completion certificates and telephonic references indicating work of similar value completed in the last ten (10) years. <table><tr><th>Sub-Criteria</th><th>Points</th></tr><tr><td>One relevant general project</td><td>5</td></tr><tr><td>Two relevant general projects</td><td>10</td></tr><tr><td>Three relevant general projects</td><td>15</td></tr></table> <p>(15)</p>	Sub-Criteria	Points	One relevant reference letter	5	Two relevant reference letters	10	Three relevant reference letters or more	15	Sub-Criteria	Points	One relevant general project	5	Two relevant general projects	10	Three relevant general projects	15	40												
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	<ul style="list-style-type: none">List of at least two Solar PV projects with appointment letters, completion certificates and telephonic references indicating work of similar value completed in the last five (5) years. These projects must be a 3-phase Solar PV installation. <table><tr><th>Sub-Criteria</th><th>Points</th></tr><tr><td>One relevant Solar PV project</td><td>5</td></tr><tr><td>Two relevant Solar PV projects</td><td>10</td></tr></table> <p>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 in order to be awarded the points.</p> <ul style="list-style-type: none">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.	Sub-Criteria	Points	One relevant Solar PV project	5	Two relevant Solar PV projects	10	(10)																
Sub-Criteria	Points																							
One relevant Solar PV project	5																							
Two relevant Solar PV projects	10																							
3	<p>Contractor's Resources – Personnel</p> <p>Proposed personnel:</p> <ul style="list-style-type: none">CVs for proposed key personnel (At least 2 – Contracts Manager & Site Agent) indicating:<ul style="list-style-type: none">Previous work experienceTotal number of years' working experience in constructionIndividual experience on relevant similar work in last five yearsCertified copies of Qualifications or other recognised training courses completedValid Professional Registration for Contracts Manager & Site Agent (ECSA or SACPCMP) <p>Contracts Manager</p> <table><tr><th>Sub-Criteria</th><th>Points</th></tr><tr><td>CV experience of less than 5 years</td><td>0</td></tr><tr><td>CV experience of more than 5 years</td><td>5</td></tr><tr><td>CV experience of more than 10 years</td><td>10</td></tr><tr><td>CV experience of more than 15 years</td><td>15</td></tr><tr><td>CV experience of more than 20 years</td><td>20</td></tr></table> <p>Site Agent</p> <table><tr><th>Sub-Criteria</th><th>Points</th></tr><tr><td>CV experience of less than 5 years</td><td>0</td></tr><tr><td>CV experience of more than 5 years</td><td>5</td></tr><tr><td>CV experience of more than 10 years</td><td>10</td></tr><tr><td>CV experience of more than 15 years</td><td>15</td></tr></table>	Sub-Criteria	Points	CV experience of less than 5 years	0	CV experience of more than 5 years	5	CV experience of more than 10 years	10	CV experience of more than 15 years	15	CV experience of more than 20 years	20	Sub-Criteria	Points	CV experience of less than 5 years	0	CV experience of more than 5 years	5	CV experience of more than 10 years	10	CV experience of more than 15 years	15	35 <
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CV experience of more than 10 years	10																							
CV experience of more than 15 years	15																							

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 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

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 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.

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: THE TENDER
Part T2: Returnable Documents

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
CONTRACT NO:	SANBI G550/2025

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 points claim form in terms of the Preferential Procurement Regulations 2022 (T2.1.06)	6 Pages	■ Yes □ No
Resources to be employed in terms of organization and staffing (T2.1.07)	2 Pages	■ Yes □ No
Estimated Monthly Expenditure (T2.1.08)	1 Page	■ Yes □ No
Compensation of Occupational Injuries and Disease Act (COIDA) (T2.1.18)	1 Page	■ Yes □ No

2. OTHER DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES

Tender document name	Number of pages issued	Returnable document
Bidders Disclosure (T2.1.10)	2 Pages	■ Yes □ No
Medical Certificate for the confirmation of permanent disabled status (T2.1.11)	1 Page	■ Yes □ No
Proof of registration with Construction Industry Development Board (T2.1.12)	1 Page	■ Yes □ No
Copy of CSD Registration Certificate (T2.1.14)	1 Page	■ Yes □ No
Financial Reference (T2.1.15)	1 Page	■ Yes □ No
Equipment Datasheets (T2.1.20)	1 Page	■ Yes □ No
Proof of Liability Insurance (T2.1.22)	1 Page	■ 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 (T2.1.16)	1 Page	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Compulsory Enterprise Questionnaire (T2.1.17)	3 Pages	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> 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	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Priced Bill of Quantities	52 Pages	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

C1.1 Offer portion of Form of Offer and Acceptance**C1.2 Contract Data (Part 2)****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 FINANCIAL ENVELOPE (ORIGINAL TENDER DOCUMENT INCLUDING ALL PRICING & RETURNABLES)

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	
Form T2.1.08	Estimated Monthly Expenditure	

**B TECHNICAL ENVELOPE
(ORIGINAL DOCUMENT + MEMORY STICK AND EXCLUDING PRICING)**

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 points claim form in terms of the Preferential Procurement Regulations 2022	
T2.1.07	Resources to be employed in terms of organization and staffing	
T2.1.09	Site Inspection Certificate	
T2.1.10	Bidders Disclosure	
T2.1.11	Medical Certificate for the confirmation of permanent disabled status	
T2.1.12	Proof of registration with Construction Industry Development Board (T2.1.12)	
T2.1.13	Original Valid Tax Clearance Certificate	
T2.1.14	CSD Registration Report	
T2.1.15	Financial Reference	
T2.1.16	Record of Addenda to Tender Documents	
T2.1.17	Compulsory Enterprise Questionnaire	
T2.1.18	Compensation of Occupational Injuries and Disease Act (COIDA)	
T2.1.22	Proof of Liability Insurance	

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

PART T: THE TENDER
Part T2: Returnable Documents

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
CONTRACT NO:	SANBI G550/2025

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.

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

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:

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”.

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)

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

	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.

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

T2.1.04: SCHEDULE OF PROPOSED SUBCONTRACTORS

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
CONTRACT NO:	SANBI G550/2025

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:	
------------------------------	--

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract
Contract: **SANBI G550/2025**

T2.1.05: CAPACITY OF TENDERER

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
CONTRACT NO:	SANBI G550/2025

- 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 technicians employed		Unskilled employees employed	
Categories of technicians	Number	Categories of employees	Number

1.1. Provide full particulars of:

Machinery	Equipment	Workshops

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

2. PARTICULARS OF COMMITMENTS WHICH THE TENDERER HAS PREVIOUSLY COMPLETED AND PRESENTLY ENGAGED WITH:**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								
11								

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

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									
9									
10									

Name of Tenderer	Signature	Date

T2.1.06: PREFERENCE POINT SYSTEM

SBD 6.1

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

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

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

1. GENERAL CONDITIONS

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

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

1.2 To be completed by the organ of state

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

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

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

1.4 To be completed by the organ of state:

The maximum points for this tender are allocated as follows:

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

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

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

2. DEFINITIONS

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

3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1. POINTS AWARDED FOR PRICE

3.1.1 THE 80/20 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
$Ps = 80 \left(1 - \frac{Pt - P_{min}}{P_{min}} \right)$	or	$Ps = 90 \left(1 - \frac{Pt - P_{min}}{P_{min}} \right)$

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmin = Price of lowest acceptable tender

4. POINTS AWARDED FOR SPECIFIC GOALS

- 4.1. In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in table 1 below as may be supported by proof/ documentation stated in the conditions of this tender:
- 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 organs of state: Where either the 90/10 or 80/20 preference point system is applicable, corresponding points must also be indicated as such.)

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

The specific goals allocated points in terms of this tender	Number of points allocated (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 the CSD report. Points will be allocated based on the percentage of ownership per goal Black Ownership = 10 Points		(10)		
Categories of persons historically disadvantaged by unfair discrimination on the basis of gender. Information will be verified on the CSD report. Points will be allocated based on the percentage of ownership per goal Female Ownership = 10 Points		(10)		
Total		20		

DECLARATION WITH REGARD TO COMPANY/FIRM

4.3. Name of company/firm.....

4.4. Company registration number:

4.5. TYPE OF COMPANY/ FIRM

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

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:

.....

.....

.....

The Tenderer shall list below the key personnel (including first nominee and the second choice alternate), whom he proposes to employ on the Contract should his tender be accepted, both at his headquarters and on the Site, to direct and for the execution of the work, together with their qualifications, experience, positions held and their nationalities.

DESIGNATION	NAME AND NATIONALITY OF: (i) NOMINEE (ii) ALTERNATE	SUMMARY OF QUALIFICATIONS, EXPERIENCE AND PRESENT OCCUPATION
HEADQUARTERS		
Partner/Director		
Project manager		
Other key staff (give designation)		

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract
Contract: **SANBI G550/2025**

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract
Contract: **SANBI G550/2025**

[illegible]

T2.1.08: ESTIMATED MONTHLY EXPENDITURE

The Tenderer shall state below the estimated value of work to be completed every month, based on his preliminary programme and his tendered unit rates.

The amounts for contingencies and Contract Price Adjustment must not be included ***OR** the amount for contingencies must not be included.

MONTH	VALUE
1	R
2	R
3	R
4	R
5	R
6	R
	COMPLETION OF CONTRACT
TOTAL	R

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

T2.2.09: Compulsory Site Inspection Meeting Certificate

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
BID No.:	SANBI G550/2025

This is to certify that I, _____ representing
_____ in the company of
_____ visited the site on: _____

I have made myself familiar with all local conditions likely to influence the work and the cost thereof. I further certify that I am satisfied with the description of the work and explanations given at the site inspection meeting and that I understand perfectly the work to be done, as specified and implied, in the execution of this contract.

Name of Tenderer	Signature	Date

Name of Principal Agent	Signature	Date

T2.1.10: Bidders Disclosure

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
CONTRACT NO:	SANBI G550/2025

1. PURPOSE OF THE FORM

Any person (natural or juristic) may make an offer or offers in terms of this invitation to bid. In line with the principles of transparency, accountability, impartiality, and ethics as enshrined in the Constitution of the Republic of South Africa and further expressed in various pieces of legislation, it is required for the bidder to make this declaration in respect of the details required hereunder.

Where a person/s are listed in the Register for Tender Defaulters and / or the List of Restricted Suppliers, that person will automatically be disqualified from the bid process.

2. Bidder's declaration

2.1 Is the bidder, or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest¹ in the enterprise, employed by the state? **YES/NO**

2.1.1 If so, furnish particulars of the names, individual identity numbers, and, if applicable, state employee numbers of sole proprietor/ directors / trustees / shareholders / members/ partners or any person having a controlling interest in the enterprise, in table below.

Full Name	Identity Number	Name of State institution

2.2 Do you, or any person connected with the bidder, have a relationship with any person who is employed by the procuring institution? **YES/NO**

2.2.1 If so, furnish particulars:

.....

2.3 Does the bidder or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest in the enterprise have any interest in any other related enterprise whether or not they are bidding for this contract? **YES/NO**

2.3.1 If so, furnish particulars:

.....

¹ the power, by one person or a group of persons holding the majority of the equity of an enterprise, alternatively, the person/s having the deciding vote or power to influence or to direct the course and decisions of the enterprise.

3 DECLARATION

I, the undersigned, (name)..... in submitting the accompanying bid, do hereby make the following statements that I certify to be true and complete in every respect:

- 3.1 I have read and I understand the contents of this disclosure;
- 3.2 I understand that the accompanying bid will be disqualified if this disclosure is found not to be true and complete in every respect;
- 3.3 The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium² will not be construed as collusive bidding.
- 3.4 In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications, prices, including methods, factors or formulas used to calculate prices, market allocation, the intention or decision to submit or not to submit the bid, bidding with the intention not to win the bid and conditions or delivery particulars of the products or services to which this bid invitation relates.
- 3.4 The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.
- 3.5 There have been no consultations, communications, agreements or arrangements made by the bidder with any official of the procuring institution in relation to this procurement process prior to and during the bidding process except to provide clarification on the bid submitted where so required by the institution; and the bidder was not involved in the drafting of the specifications or terms of reference for this bid.
- 3.6 I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

I CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 1, 2 and 3 ABOVE IS CORRECT.

I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME IN TERMS OF PARAGRAPH 6 OF PFMA SCM INSTRUCTION 03 OF 2021/22 ON PREVENTING AND COMBATING ABUSE IN THE SUPPLY CHAIN MANAGEMENT SYSTEM SHOULD THIS DECLARATION PROVE TO BE FALSE.

.....
Signature

.....
Date

.....
Position

.....
Name of bidder

² Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

T2.1.11: MEDICAL CERTIFICATE FOR THE CONFIRMATION OF PERMANENT DISABLED STATUS

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
CONTRACT NO:	SANBI G550/2025

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 ofand 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 thisday of..... of.....

.....
Signature

.....
Date

**OFFICIAL STAMP OF
MEDICAL PRACTITIONER**

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

T2.1.12: PROOF OF REGISTRATION WITH CONSTRUCTION INDUSTRY DEVELOPMENT BOARD

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
CONTRACT NO:	SANBI G550/2025

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:

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

T2.1.14: COPY OF CSD REGISTRATION REPORT

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
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A copy of Central Suppliers Database (CSD) Registration Report must be included for evaluation purposes.

T2.1.15: FINANCIAL REFERENCES

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
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Notes to tenderer:

1. The tenderer shall attach to this form a letter from the bank in which it is declared how he conducts his account. The contents of the bank's letter must state the credit rating that the bank, in addition to the information required below, accords to the tenderer for the business envisaged by this tender. Failure to provide the required letter with the tender submission may render the tenderer's offer unresponsive in terms of tender condition C3.8.
2. The tenderer's banking details as they appear below shall be completed.
3. In the event that the tenderer is a joint venture enterprise, details of all the members of the joint venture shall be similarly provided and attached to this form.

Details of Company's Bank

DESCRIPTION OF BANK DETAIL	BANK DETAILS APPLICABLE TO TENDERER'S HEAD OFFICE
Name of bank	
Branch name	
Branch code	
Street address	
Postal address	
Name of manager	
Telephone number	
Fax number	
Account number	

South African National Biodiversity Institute

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T2.1.16: RECORD OF ADDENDA TO TENDER DOCUMENTS

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
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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

T2.1.17: COMPULSORY ENTERPRISE QUESTIONNAIRE

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

Section 1: Name of enterprise:

Section 2: VAT registration number, if any:

Section 3: PSIRA 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:

- | | |
|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> a member of any municipal council | <input type="checkbox"/> an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No 1 of 1999) |
| <input type="checkbox"/> a member of any provincial legislature | |
| <input type="checkbox"/> a member of the National Assembly or the National Council of Province | |
| <input type="checkbox"/> a member of the board of directors of any municipal entity | <input type="checkbox"/> a member of an accounting authority of any national or provincial public entity |
| <input type="checkbox"/> an official of any municipality or municipal entity | <input type="checkbox"/> 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:

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

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

*Insert separate page if necessary.

South African National Biodiversity Institute

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Contract: **SANBI G550/2025**

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:

South African National Biodiversity Institute

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T2.1.18: COMPENSATION OF OCCUPATIONAL INJURIES AND DISEASE ACT (COIDA)

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
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Letter of Good Standing from the office of the Compensation Commissioner as required by the Compensation for Occupational Injuries and Diseases Act (COIDA) must be included for evaluation purposes. The letter should be issued by the Department of Labour.

South African National Biodiversity Institute

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Contract: **SANBI G550/2025**

T2.1.22: PROOF OF LIABILITY INSURANCE

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
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The tender shall append their Proof of Liability Insurance behind this page.

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

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
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C1.1 Form of Offer and Acceptance

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

REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION CONTRACT

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:

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

Name & signature of witness Date

[Failure of a Tenderer to complete and sign this form will invalidate the tender]

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 <i>[which includes this Agreement]</i>
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

.....

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.

South African National Biodiversity Institute

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Contract: **SANBI G550/2025**

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

South African National Biodiversity Institute

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

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
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C1.2 Contract Data

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

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

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

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

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

Provision of Contract Data

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

Reference Clauses

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

TABLE OF CONTENTS

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

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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.: 012 843 5205
	VAT no.		
	E-mail:		
1.2 [5.1]	Principal Agent:	Virtual Consulting Engineers VCE (Pty) Ltd	Person: Mr Shahien Ishmail
	Postal Address:	P.O. Box 82, Crawford	Code: 7779
	Tel no.:	021 685 0789	Fax no.: 086 655 2690
	E-mail:	shahien@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):		Person:
	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:

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".

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

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	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		
1.10	The principal agent named in 1.2 above is responsible for the preparation of the contract data schedule and must be contacted should the contractor be uncertain of the information provided or to be provided. Failure to complete the contract data schedule in full may result in the tender being disqualified.			
2.0	CONTRACT AND SITE INFORMATION			
2.1 [1.7]	The law applicable to this agreement :	(Country / State)	RSA	
2.2 [1.1]	Works identification:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION CONTRACT		
2.3 [1.1]	Site description:	Kirstenbosch National Botanical Garden, Cape Town		
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: <ul style="list-style-type: none"> 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. 	

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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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)	No
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)	Yes
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)	No
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)	No
3.0	INSURANCE AND SECURITIES		
3.1 [10.1.1], [12.6]	Contract works insurance to be effected by:	(Employer / Contractor)	Contractor

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	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:	6 months after date of site handover (Excl. Builders Holiday)	R1 700-00 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) Certificates of compliance

(2) All guarantees

(3)

(4)

(5)

(6)

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

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

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

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

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 *Add the following clause:*
[9.3]

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

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

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 effect 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
[12.3] *Replace the clause with the following:*
- 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]
- 6.14
[14.1] *Replace the clause with the following:*
- Security:
- The securities to be provided by the **Contractor** are:
- (1) Variable construction guarantee
 - (2) Fixed construction guarantee
 - (3) Advance payment guarantee
- 6.14
[15.2.1] *Replace the clause with the following:*
- 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
[25.3] *Replace the clause with the following:*
- 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
[25.3.1] *Replace the clause with the following:*
- 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
[25.3.2] *Replace the clause with the following:*
- 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
[26.1] *Replace the clause with the following:*
- 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
[26.4] *Replace the clause with the following:*
- 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
[26.4.1] *Replace the clause with the following:*

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

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

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

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

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

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

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

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

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
[34.1] *Replace the clause with the following:*
- 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
[34.2] *Add the following clause:*
- 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
[34.5] *Add the following:*
- The final payment certificate shall be issued by the **Employer**.
- 6.35
[34.9] *Replace the clause with the following:*
- 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
[34.10] The **Employer** shall pay to the **Contractor** the amount certified for payment in the final **payment 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
[34.12] *Replace the last sentence with:*
- 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
[36.1] *Replace the clause with the following:*
- The **Employer** may, without prejudice of any other rights available to him, cancel this **agreement** where the **Contractor**:
- 6.39
[36.2] *Replace the clause with the following:*
- 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
[37.2] *Replace the clause with the following:*
- 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
[39.2] *Add the following clause:*
- 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
[39.2.1] *Add the following clause:*
- An amount not exceeding ten per cent (10%) of the **contract sum**.
- 6.43
[39.2.2] *Add the following clause:*
- Ten per cent (10%) of the value of incomplete work.

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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.

Definitions

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

Provision of Contract Data

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

Reference Clauses

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

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2.0	SECURITIES
3.0	PAYMENT AND ADJUSTMENT OF PRELIMINARIES
4.0	EMPLOYER CHANGES TO JBCC STANDARD DOCUMENTS
5.0	THE TENDER

CONTRACT DATA – CONTRACTOR

1.0 CONTRACTING PARTY

1.1

[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 an adjustment shall be based on the particulars provided by the **contractor** for this purpose in terms of Option A or B and shall preclude any further adjustment of preliminaries.

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

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**

5.8.2 **Employer allowances** stated by the **principal agent**

5.8.3 **SUB TOTAL**

5.8.4 **Add tax** on 5.8.3

5.8.5 **TOTAL TENDER SUM inclusive of tax**

5.8.6 Tender Sum in words

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Contract: **SANBI G550/2025**

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:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
CONTRACT NO:	SANBI G550/2025

C1.3 Form of Construction Guarantee (Pro Forma)

**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: **SANBI G550/2025 Requests for Bids for The Appointment of a Contractor for The Renovation Work to The Goldfields Education Centre for The South African National Biodiversity Institute at The Kirstenbosch National Botanical Garden, Cape Town** (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 fulfillment 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 foregoing, 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: SANBI G550/2025 Requests for Bids for The Appointment of a Contractor for The Renovation Work to The Goldfields Education Centre for The South African National Biodiversity Institute at The Kirstenbosch National Botanical Garden, Cape Town** (hereinafter referred to as the “contract”) in the amount of (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 fulfillment 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 foregoing, 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)

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

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:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
CONTRACT NO:	SANBI G550/2025

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

AGREEMENT MADE AND ENTERED INTO BETWEEN THE
SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE (SANBI)
(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

Signed at this day of 20

MANDATARY

.....
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.

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

PART C: THE CONTRACT
Part C2: Pricing Data and Bill of Quantities

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
CONTRACT NO:	SANBI G550/2025

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C2.2	Bill of Quantities	93

PART C: THE CONTRACT
Part C2: Pricing Instruction and Bill of Quantities

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
CONTRACT NO:	SANBI G550/2025

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. The 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.

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

PART C: THE CONTRACT
Part C2: Pricing Data and Bill of Quantities

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
CONTRACT NO:	SANBI G550/2025

C2.2 Bill of Quantities

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract
Contract: **SANBI G550/2025**

1-1

TENDER NO: G550/2025

CLIENT: SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE

TITLE OF THE REQUEST FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION PROJECT: CENTRE FOR THE SANBI AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN

SCHEDULES FOR REPAIR WORK		REPAIR	MAINTENANCE
SCHEDULE NO 1:	PRELIMINARY AND GENERAL	100	
SCHEDULE NO 2:	STRUCTURAL AND BUILDING RELATED REPAIR WORK	200	
SCHEDULE NO 3:	PLUMBING AND DRAINAGE RELATED REPAIR WORK	300	
SCHEDULE NO 4:	BUILDING ELECTRICAL RELATED REPAIR WORK	400	
SCHEDULE NO 5:	PV INSTALLATION	500	
SCHEDULE NO 6:	CIVIL RELATED REPAIR WORK	600	
SCHEDULE NO 7:	CONVENTIONAL FIRE FIGHTING EQUIPMENT AND FIRE DETECTION SYSTEM	700	
SCHEDULE NO 8:	HEATING VENTILATION AND AIRCONDITIONING	800	

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".

Tender No: SANBI G550/2025

SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE (SANBI)

REPAIRS AND UPGRADES OF THE EXISTING NURSERIES AND ASSOCIATED GLASSHOUSE
INFRASTRUCTURE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN**SCHEDULE OF QUANTITIES****NB** TENDERES MUST COMPLETE THE SCHEDULE OF QUANTITIES IN BLAC INK**SCHEDULE NO 1: PRELIMINARY AND GENERAL**

ITEM	DESCRIPTION	AMOUNT
	<p>MEANING OF TERMS "TENDER / TENDERER"</p> <p>Any reference to the words "Tender" or "Tenderer" herein and/or in any other documentation shall be construed to have the same meaning as the words "Bid" or "Bidder"</p> <p>PRELIMINARIES</p> <p>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"</p> <p>PRICING OF PRELIMINARIES</p> <p>Should Option A, as set out in clause B10.3.1 hereinafter be used for the adjustment of preliminaries then each item priced is to be allocated to one or more of the three categories Fixed, Value Related or Time Related and the respective amounts entered in the spaces provided under each item</p> <p>Items not priced in these Preliminaries shall be deemed to be included elsewhere in these Bills of Quantities</p> <p>SECTION A: JBCC PRINCIPAL BUILDING AGREEMENT</p> <p>DEFINITIONS</p> <p>A1.0 DEFINITIONS AND INTERPRETATION</p> <p>Refer to Contract Data</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p> <p>OBJECTIVE AND PREPARATION</p> <p>A2.0 OFFER, ACCEPTANCE AND PERFORMANCE</p> <p>Clause 2.0</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
A3.0	<p>DOCUMENTS</p> <p>Clause 3.0</p> <p>Clause 3.2.1 is amended by replacing “14.1” with “14.0” Clause 3.7 is amended by the addition of the following:</p> <p>The contractor shall supply and keep a copy of the JBCC Series 2000 Principal Building Agreement and Preliminaries applicable to this contract on the site, to which the employer, principal agent and agents shall have access at all times</p> <p>Clause 3.11 is amended by replacing the second reference to “principal agent” with the word “employer”</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A4.0	<p>DESIGN RESPONSIBILITY</p> <p>Clause 4.0</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A5.0	<p>EMPLOYER’S AGENTS</p> <p>Clause 5.0</p> <p>Clause 5.1.2 is amended to include clauses 32.6.3, 34.3, 34.4 and 38.5.8</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A6.0	<p>CONTRACTOR'S SITE REPRESENTATIVE</p> <p>Clause 6.0</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A7.0	<p>COMPLIANCE WITH LAWS AND REGULATIONS</p> <p>Clause 7.0</p> <p>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</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A8.0	<p>WORKS RISK</p> <p>Clause 8.0</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
A9.0	<p>INDEMNITIES</p> <p>Clause 9.0</p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>	
A10.0	<p>GENERAL INSURANCES</p> <p>Clause 10.0</p> <p>Clause 10.0 is amended by the addition of the following clauses:</p> <p>10.5 Damage to the Works</p> <p>(a) Without in any way limiting the contractor's obligations in terms of the contract, the contractor shall bear the full risk of damage to and/or destruction of the works by whatever cause during construction of the works and hereby indemnifies and holds harmless the employer against any such damage. The contractor shall take such precautions and security measures and other steps for the protection and security of the works as the contractor may deem necessary</p> <p>(b) The contractor shall at all times proceed immediately to remove or dispose of any debris arising from damage to or destruction of the works and to rebuild, restore, replace and/or repair the works</p> <p>(c) The employer shall carry the risk of damage to or destruction of the works and materials paid for by the employer that is the result of the excepted risks as set out in 10.6</p> <p>(d) Where the employer bears the risk in terms of this contract, the contractor shall, if requested to do so, reinstate any damage or destroyed portions of the works and the costs of such reinstatement shall be measured and valued in terms of 32.0 hereof</p> <p>10.6 Injury to Persons or loss of or damage to Properties</p> <p>(a) The contractor shall be liable for and hereby indemnifies the employer against any liability, loss, claim or proceeding whether arising in common law or by statute, consequent upon personal injuries to or the death of any person whomsoever arising out of or in the course of or caused by the execution of the works unless due to any act or negligence of any person for whose actions the employer is legally liable</p> <p>(b) The contractor shall be liable for and hereby indemnifies the employer against any liability, loss, claim or proceeding consequent upon loss of or damage to any moveable or immovable or personal property or property contiguous to the site, whether belonging to or under the control of the employer or any other body or person, arising out of or in the course of or by reason of the execution of the works unless due to any act or negligence of any person for whose actions the employer is legally liable</p> <p>(c) The contractor shall, upon receiving a contract instruction from the principal agent, cause the same to be made good in a perfect and workmanlike manner at his own cost and in default thereof the employer shall be entitled to cause it to be made good and to recover the cost thereof from the contractor or to deduct the same from amounts due to the contractor</p>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	<p>(d) The contractor shall be responsible for the protection and safety of such portions of the premises placed under his control by the employer for the purpose of executing the works until the issue of the certificate of practical completion</p> <p>(e) Where the execution of the works involves the risk of removal of or interference with support to adjoining properties including land or structures or any structures to be altered or added to, the contractor shall obtain adequate insurance and will remain adequately insured or insured to the specific limit stated in the contract against the death of or injury to persons or damage to such property consequent on such removal or interference with the support until such portion of the works has been completed</p> <p>10.7 High risk insurance</p> <p>In the event of the project being executed in a geological area classified as a "High Risk Area", that is an area which is subject to highly unstable subsurface conditions that might result in catastrophic ground movement evident by sinkhole or doline formation the following will apply:</p> <p>10.7.1 Damage to the works</p> <p>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</p> <p>When so instructed to do so by the principal agent, the contractor shall proceed immediately to remove and/or dispose of any debris arising from damage to or destruction of the works and to rebuild, restore, replace and/or repair the works, at the contractor's own costs</p> <p>10.7.2 Injury to persons or loss of or damage to property</p> <p>The contractor shall be liable for and hereby indemnifies and holds harmless the employer against any liability, loss, claim or proceeding arising at any time during the period of the contract whether arising in common law or by statute, consequent upon personal injuries to or the death of any person whomsoever resulting from, arising out of, or caused by a catastrophic ground movement as mentioned above</p> <p>The contractor shall be liable for and hereby indemnifies the employer against any and all liability, loss, claim or proceeding consequent upon loss of or damage to any moveable or immovable or personal property or property contiguous to the site, whether belonging to or under the control of the employer or any other body or person whomsoever arising out of or caused by a catastrophic ground movement, as mentioned above, which occurred during the period of the contract</p>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	<p>10.7.3 It is the responsibility of the contractor to ensure that he has adequate insurance to cover his risk and liability as mentioned in 10.7.1 and 10.7.2. Without limiting the contractor's obligations in terms of the contract, the contractor shall, within twenty-one (21) calendar days of the commencement date but before commencement of the works, submit to the employer proof of such insurance policy, if requested to do so</p> <p>10.7.4 The employer shall be entitled to recover any and all losses and/or damages of whatever nature suffered or incurred consequent upon the contractor's default of his obligations as set out in 10.7.1; 10.7.2 and 10.7.3. Such losses or damages may be recovered from the contractor or by deducting the same from any amounts still due under this contract or under any other contract presently or hereafter existing between the employer and the contractor and for this purpose all these contracts shall be considered one indivisible whole</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A11.0	<p>SPECIAL INSURANCES</p> <p>Clause 11.0</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A12.0	<p>EFFECTING INSURANCES</p> <p>Clause 12.0</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A13.0	No clause	
A14.0	<p>SECURITY</p> <p>Clause 14.0</p> <p>Clauses 14.1 - 14.8 are amended by replacing them with the following:</p> <p>14.1 In respect of contracts with a contract sum up to R1 million, the security to be provided by the contractor to the employer will be a payment reduction of five per cent (5%) of the value certified in the payment certificate (excluding VAT)</p> <p>14.1.1 The payment reduction of the value certified in a payment certificate shall be mutatis mutandi in terms of 31.8(A)</p> <p>14.1.2 The employer shall be entitled to recover expense and loss from the payment reduction in terms of 33.0 provided that the employer complies with the provisions of 33.4 in which event the employer's entitlement shall take precedence over his obligations to refund the payment reduction security or portions thereof to the contractor</p>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	<p>14.2 In respect of contracts with a contract sum above R1 million, the contractor shall have the right to select the security to be provided in terms of 14.3, 14.4, 14.5, 14.6, or 14.7 as stated in the schedule. Such security shall be provided to the employer within twenty-one (21) calendar days from commencement date. Should the contractor fail to select the security to be provided or should the contractor fail to provide the employer with the selected security within twenty-one (21) calendar days from commencement date, the security in terms of 14.7 shall be deemed to have been selected</p> <p>14.3 Where security as a cash deposit of ten per cent (10%) of the contract sum (excluding VAT) has been selected:</p> <p>14.3.1 The contractor shall furnish the employer with a cash deposit equal in value to ten per cent (10%) of the contract sum (excluding VAT) within twenty-one (21) calendar days from commencement date</p> <p>14.3.2 Within twenty-one (21) calendar days of the date of practical completion of the works the employer shall reduce the cash deposit to an amount equal to three per cent (3%) of the contract value (excluding VAT), and refund the balance to the contractor</p> <p>14.3.3 Within twenty-one (21) calendar days of the date of final completion of the works the employer shall reduce the cash deposit to an amount equal to one per cent (1%) of the contract value (excluding VAT) and refund the balance to the contractor</p> <p>14.3.4 On the date of payment of the amount in the final payment certificate, the employer shall refund the remainder of the cash deposit to the contractor</p> <p>14.3.5 The employer shall be entitled to recover expense and loss from the cash deposit in terms of 33.0 provided that the employer complies with the provisions of 33.4 in which event the employer's entitlement shall take precedence over his obligations to refund the cash deposit security or portions thereof to the contractor</p> <p>14.3.6 The parties expressly agree that neither the employer nor the contractor shall be entitled to cede the rights to the deposit to any third party</p> <p>14.4 Where security as a variable construction guarantee of ten percent (10%) of the contract sum (excluding VAT) has been selected:</p> <p>14.4.1 The contractor shall furnish the employer with an acceptable variable construction guarantee equal in value to ten per cent (10%) of the contract sum (excluding VAT) within twenty-one (21) calendar days from commencement date</p> <p>14.4.2 The variable construction guarantee shall reduce and expire in terms of the Variable Construction Guarantee form included in the invitation to tender</p> <p>14.4.3 The employer shall return the variable construction guarantee to the contractor within fourteen (14) calendar days of it expiring</p> <p>14.4.4 Where the employer has a right of recovery against the contractor in terms of 33.0, the employer shall issue a written demand in terms of the variable construction guarantee</p>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	<p>14.5 Where security as a fixed construction guarantee of five per cent (5%) of the contract sum (excluding VAT) and a five per cent (5%) payment reduction of the value certified in the payment certificate (excluding VAT) has been selected:</p> <p>14.5.1 The contractor shall furnish a fixed construction guarantee to the employer equal in value to five per cent (5%) of the contract sum (excluding VAT)</p> <p>14.5.2 The fixed construction guarantee shall come into force on the date of issue and shall expire on the date of the last certificate of practical completion</p> <p>14.5.3 The employer shall return the fixed construction guarantee to the contractor within fourteen (14) calendar days of it expiring</p> <p>14.5.4 The payment reduction of the value certified in a payment certificate shall be in terms of 31.8 (A) and 34.8</p> <p>14.5.5 Where the employer has a right of recovery against the contractor in terms of 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</p> <p>14.6 Where security as a cash deposit of five per cent (5%) of the contract sum (excluding VAT) and a payment reduction of five per cent (5%) of the value certified in the payment certificate (excluding VAT) has been selected:</p> <p>14.6.1 The contractor shall furnish the employer with a cash deposit equal in value to five per cent (5%) of the contract sum (excluding VAT) within twenty-one (21) calendar days from commencement date</p> <p>14.6.2 Within twenty-one (21) calendar days of the date of practical completion of the works the employer shall refund the cash deposit in total to the contractor</p> <p>14.6.3 The payment reduction of the value certified in a payment certificate shall be mutatis mutandi in terms of 31.8(A)</p> <p>14.6.4 Where the employer has a right of recovery against the contractor in terms of 33.0, the employer may issue a written notice in terms of 33.4 or may recover from the payment reduction or may do both</p> <p>14.7 Where security as a payment reduction of ten per cent (10%) of the value certified in the payment certificate (excluding VAT) has been selected:</p> <p>14.7.1 The payment reduction of the value certified in a payment certificate shall be mutatis mutandi in terms of 31.8(B)</p> <p>14.7.2 The employer shall be entitled to recover expense and loss from the payment reduction in terms of 33.0 provided that the employer complies with the provisions of 33.4 in which event the employer's entitlement shall take precedence over his obligations to refund the payment reduction or portions thereof to the contractor</p> <p>14.8 Payments made by the guarantor to the employer in terms of the fixed or variable construction guarantee shall not prejudice the rights of the employer or contractor in terms of this agreement</p> <p>14.9 Should the contractor fail to furnish the security in terms of 14.2, the employer, in his sole discretion and without notification to the contractor, is entitled to change the contractor's selected form of security to that of a ten per cent (10%) payment reduction of the value certified in the payment certificate (excluding VAT), whereafter 14.7 shall be applicable</p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	<p>EXECUTION</p> <p>PREPARATION FOR AND EXECUTION OF THE WORKS</p> <p>Clause 15.0</p> <p>Clause 15.1.1 is amended by replacing it with:</p> <p>No clause</p> <p>Clause 15.1.2 is amended by replacing it with:</p> <p>The security selected in terms of 14.0</p> <p>Clause 15.1 is amended by the addition of the following clause:</p> <p>15.1.4 An acceptable health and safety plan, required in terms of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), within twenty-one (21) calendar days of commencement date</p> <p>Clause 15.2.1 is amended by replacing it with the following clause:</p> <p>Give the contractor possession of the site within ten (10) working days of the contractor complying with the terms of 15.1.4</p> <p>Fixed: _____ Value related: _____ Time related: _____ <div style="text-align: right;">Item</div></p> <p>14.4.1 The contractor shall furnish the employer with an acceptable variable construction guarantee equal in value to ten per cent (10%) of the contract sum (excluding VAT) within twenty-one (21) calendar days from commencement date</p> <p>14.4.2 The variable construction guarantee shall reduce and expire in terms of the Variable Construction Guarantee form included in the invitation to tender</p> <p>14.4.3 The employer shall return the variable construction guarantee to the contractor within fourteen (14) calendar days of it expiring</p> <p>14.4.4 Where the employer has a right of recovery against the contractor in terms of 33.0, the employer shall issue a written demand in terms of the variable construction guarantee</p> <p>14.5 Where security as a fixed construction guarantee of five per cent (5%) of the contract sum (excluding VAT) and a five per cent (5%) payment reduction of the value certified in the payment certificate (excluding VAT) has been selected:</p> <p>14.5.1 The contractor shall furnish a fixed construction guarantee to the employer equal in value to five per cent (5%) of the contract sum (excluding VAT)</p> <p>14.5.2 The fixed construction guarantee shall come into force on the date of issue and shall expire on the date of the last certificate of practical completion</p> <p>14.5.3 The employer shall return the fixed construction guarantee to the contractor within fourteen (14) calendar days of it expiring</p>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
	<p>14.5.4 The payment reduction of the value certified in a payment certificate shall be in terms of 31.8 (A) and 34.8</p> <p>14.5.5 Where the employer has a right of recovery against the contractor in terms of 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</p> <p>14.6 Where security as a cash deposit of five per cent (5%) of the contract sum (excluding VAT) and a payment reduction of five per cent (5%) of the value certified in the payment certificate (excluding VAT) has been selected:</p> <p>14.6.1 The contractor shall furnish the employer with a cash deposit equal in value to five per cent (5%) of the contract sum (excluding VAT) within twenty-one (21) calendar days from commencement date</p> <p>14.6.2 Within twenty-one (21) calendar days of the date of practical completion of the works the employer shall refund the cash deposit in total to the contractor</p> <p>14.6.3 The payment reduction of the value certified in a payment certificate shall be mutatis mutandi in terms of 31.8(A)</p> <p>14.6.4 Where the employer has a right of recovery against the contractor in terms of 33.0, the employer may issue a written notice in terms of 33.4 or may recover from the payment reduction or may do both</p> <p>14.7 Where security as a payment reduction of ten per cent (10%) of the value certified in the payment certificate (excluding VAT) has been selected:</p> <p>14.7.1 The payment reduction of the value certified in a payment certificate shall be mutatis mutandi in terms of 31.8(B)</p> <p>14.7.2 The employer shall be entitled to recover expense and loss from the payment reduction in terms of 33.0 provided that the employer complies with the provisions of 33.4 in which event the employer's entitlement shall take precedence over his obligations to refund the payment reduction or portions thereof to the contractor</p> <p>14.8 Payments made by the guarantor to the employer in terms of the fixed or variable construction guarantee shall not prejudice the rights of the employer or contractor in terms of this agreement</p> <p>14.9 Should the contractor fail to furnish the security in terms of 14.2, the employer, in his sole discretion and without notification to the contractor, is entitled to change the contractor's selected form of security to that of a ten per cent (10%) payment reduction of the value certified in the payment certificate (excluding VAT), whereafter 14.7 shall be applicable</p>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
A15.0	<p>EXECUTION</p> <p>PREPARATION FOR AND EXECUTION OF THE WORKS</p> <p>Clause 15.0</p> <p>Clause 15.1.1 is amended by replacing it with:</p> <p>Clause 15.1.2 is amended by replacing it with:</p> <p>The security selected in terms of 14.0</p> <p>Clause 15.1 is amended by the addition of the following clause:</p> <p>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</p> <p>Clause 15.2.1 is amended by replacing it with the following clause:</p> <p>Give the contractor possession of the site within ten (10) working days of the contractor complying with the terms of 15.1.4</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A16	<p>SITE AND ACCESS</p> <p>Clause 16.0</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A17.0	<p>CONTRACT INSTRUCTIONS</p> <p>Clause 17.0</p> <p>Clause 17.1.11 is amended by deleting the words “and the appointment of nominated and selected subcontractors”</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A18.0	<p>SETTING OUT OF THE WORKS</p> <p>Clause 18.0</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A19.0	<p>TEMPOARARY WORKS AND PLANT</p> <p>Clause 19.0</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
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	
A24.0	COMPLETION 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	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
A27.0	LATENT DEFECTS LIABILITY PERIOD Clause 27.0 Fixed: _____ Value related: _____ Time related: _____ Item	
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	
A31.0	PAYMENT 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 final 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
	<p>Alternative B</p> <p>31.8(B) Where security as a payment reduction in terms of 14.7 has been selected, the value of the works in terms of 31.4.1 and materials and goods in terms of 31.4.2 shall be certified in full. The value certified shall be subject to the following percentage adjustments:</p> <p>31.8(B).1 Ninety per cent (90%) of such value in interim payment certificates issued up to the date of practical completion</p> <p>31.8(B).2 Ninety-seven per cent (97%) of such value in interim payment certificates issued on the date of practical completion and up to but excluding the date of final completion</p> <p>31.8(B).3 Ninety-nine per cent (99%) of such value in interim payment certificates issued on the date of final completion and up to but excluding the final payment certificate in terms of 34.6</p> <p>31.8(B).4 One hundred per cent (100%) of such value in the final payment certificate in terms of 34.6 except where the amount certified is in favour of the employer. In such an event the payment reduction shall remain at the adjustment level applicable to the final payment certificate</p> <p>Clause 31.12 is amended by deleting the following:</p> <p>Payment shall be subject to the employer giving the contractor a tax invoice for the amount due</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A32.0	<p>ADJUSTMENT TO THE CONTRACT VALUE</p> <p>Clause 32.0</p> <p>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:</p> <p>"due to no fault of the contractor"</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A33.0	<p>RECOVERY OF EXPENSE AND LOSS</p> <p>Clause 33.0</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A34.0	<p>FINAL ACCOUNT AND FINAL PAYMENT</p> <p>Clause 34.0</p> <p>Clause 34.1 is amended by removing</p> <p>Clause 34.2 is amended by inserting</p>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
A35.0	<p>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”</p> <p>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”</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
	<p>PAYMENT TO OTHER PARTIES</p> <p>Clause 35.0</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A36.0	<p>TERMINATION BY EMPLOYER – CONTRACTOR’S DEFAULT</p> <p>Clause 36.0</p> <p>Clause 36.1 is amended by the addition of the following clauses</p> <p>36.1.3 refuses or neglects to comply strictly with any of the conditions of contract</p> <p>36.1.4 estate being sequestrated, liquidated or surrendered in terms of the insolvency laws in force within the Republic of South Africa</p> <p>36.1.5 in the judgement of the employer, has engaged in corrupt or fraudulent practices in competing for or in executing the contract</p> <p>Clause 36.3 is amended by removing the reference to “No clause” and replacing the words “principal agent” with “employer”</p> <p>Clause 36.0 is amended by the addition of the following clause:</p> <p>Clause 36.0 is amended by the addition of the following clause:\</p> <p>36.7 Notwithstanding any clause to the contrary, on cancellation of this agreement either by the employer or the contractor; or for any reason whatsoever, the contractor shall on written instruction, discontinue with the works on a date stated and withdraw himself from the site. The contractor shall not be entitled to refuse to withdraw from the works on the grounds of any lien or right of retention or on the grounds of any other right whatsoever</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
	<p>TERMINATION BY EMPLOYER – LOSS AND DAMAGE</p> <p>Clause 37.0</p> <p>Clause 37.3.5 is amended by replacing “ninety (90)” with “one-hundred and twenty (120)”</p> <p>Clause 37.0 is amended by the addition of the following clause:</p>	
A37.0		

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
A38.0	<p>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</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p> <p>TERMINATION BY CONTRACTOR – EMPLOYER’S DEFAULT</p> <p>Clause 38.0</p> <p>Clause 38.5.4 is amended by replacing “ninety (90)” with “one-hundred and twenty</p> <p>Clause 38.0 is amended by the addition of the following clause:</p> <p>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</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A39.0	<p>TERMINATION – CESSATION OF THE WORKS</p> <p>Clause 39.0</p> <p>Clause 39.3.5 is amended by the addition of the following at the end of the sentence:</p> <p>“within one hundred and twenty (120) working days of completion of such a report”</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
A40.0	<p>DISPUTE</p> <p>SETTLEMENT OF DISPUTES</p> <p>Clause 40.0</p> <p>Clause 40.2.2 is amended by replacing “one (1) year” with “three (3) years”</p> <p>Clause 40.6 is amended by removing the reference to:</p> <p>No clause</p> <p>Clause 40.7.1 is amended by replacing “(10)” with “(15)” and by the addition of the following:</p> <p>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</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
B1.1	<p><i>Definitions and interpretation</i></p> <p>See also clause A1.0 of Section A for additional and/or amended definitions which shall apply equally to this Section</p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>	
B2.0	DOCUMENTS	
B2.1	<p><i>Checking of documents</i></p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>	
B2.2	<p><i>Provisional bills of quantities</i></p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>	
B2.3	<p><i>Availability of construction documentation</i></p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>	
B2.4	<p><i>Interests of agents</i></p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>	
B2.5	<p><i>Priced documents</i></p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>	
B2.6	<p><i>Tender submission</i></p> <p>Clause 2.6 is amended by replacing "JBCC Form of Tender" with "The Tender Page 97"</p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>	
B3.0	THE SITE	
B3.1	<i>Defined works area</i>	
B3.2	<p><i>Geotechnical investigation</i></p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>	
B3.3	<p><i>Inspection of the site</i></p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>	
B3.4	<p><i>Existing premises occupied</i></p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
B3.5	<i>Previous work – dimensional accuracy</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B3.6	<i>Previous work – defects</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B3.7	<i>Services – known</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B3.8	<i>Services – unknown</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B3.9	<i>Protection of trees</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B3.9	<i>Protection of trees</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B3.10	<i>Articles of value</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B3.11	<i>Inspection of adjoining properties</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B4. 0	MANAGEMENT OF CONTRACT	
B4.1	<i>Management of the works</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B4.2	<i>Programme for the works</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B4.3	<i>Progress meetings</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B4.4	<i>Technical meetings</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B4.5	<i>Labour and plant records</i> 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	<i>Samples of materials</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B5.2	<i>Workmanship samples</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B5.3	<i>Shop drawings</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B5.4	<i>Compliance with manufacturers' instructions</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B6.0	TEMPORARY WORKS AND PLANT	
B6.1	<i>Deposits and fees</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B6.2	<i>Enclosure of the works</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B6.3	<i>Advertising</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B6.4	<i>Plant, equipment, sheds and offices</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B6.5	<i>Main notice board</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B6.6	<i>Subcontractors' notice board</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B7.0	TEMPORARY SERVICES	
B7.1	<i>Location</i> 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	<i>Payment certificate cash flow</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B11.0	GENERAL	
B11.1	<i>Protection of the works</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B11.2	<i>Protection / isolation of existing / sectionally occupied works</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B11.3	<i>Security of the works</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B11.4	<i>Notice before covering work</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B11.5	<i>Disturbance</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B11.6	<i>Environmental disturbance</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B11.7	<i>Works cleaning and clearing</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B11.8	<i>Vermin</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B11.9	<i>Overhand work</i> Fixed: _____ Value related: _____ Time related: _____ Item	
B11.10	<i>Instruction manuals and guarantees</i> Fixed: _____ Value related: _____ Time related: _____ Item	

SCHEDULE NO 1: PRELIMINARY AND GENERAL

ITEM	DESCRIPTION	AMOUNT
B11.11	<i>As built information</i> Fixed: _____ Value related: _____ Time related: _____ <div>Item</div>	
B11.12	Tenant installations Fixed: _____ Value related: _____ Time related: _____ <div>Item</div>	
B12.0	SCHEDULE OF VARIABLES	
B12.1	<i>Schedule of variables</i> 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 <div> <div>12,1,1</div> <div> PRE-TENDER INFORMATION <i>Refer to Contract Data</i> </div> </div> <div> <div>12,1,2</div> <div> POST-TENDER INFORMATION <i>Refer to Contract Data</i> </div> </div> Fixed: _____ Value related: _____ Time related: _____ <div>Item</div>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL (SECTION C)

ITEM	DESCRIPTION	AMOUNT
	<p>SECTION C: SPECIFIC PRELIMINARIES</p> <p>Section C contains specific preliminary items which apply to this contract except where N/A (Not Applicable) appears against an item</p>	
C1.0	<p>CONTRACT DRAWINGS</p> <p>* 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</p> <p>* 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</p> <p>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</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
C2.0	<p>PREAMBLES</p> <p>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</p> <p>The specifications are issued and shall be read in conjunction with the drawings and the bills of quantities / lump sum document</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	
C3.0	<p>TRADE NAMES</p> <p>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</p> <p>If prior written approval for an alternative product is not obtained, the product described shall be deemed to have been tendered for</p> <p>Fixed: _____ Value related: _____ Time related: _____ Item</p>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL (SECTION C)

ITEM	DESCRIPTION	AMOUNT
C4.0	<p>IMPORTED MATERIALS AND EQUIPMENT</p> <p>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)</p> <p>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)</p> <p>Fixed: _____ Value related: _____ Time related: _____ <div style="text-align: right;">Item</div></p>	
C5.0	<p>OCCUPATIONAL HEALTH AND SAFETY ACT</p> <p>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)</p> <p>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</p> <p>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</p> <p>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</p> <p>0.1 Preparation of Health and Safety Plan. Implementation and maintenance of Health and Safety Plan</p> <p>Fixed: _____ Value related: _____ Time related: _____ <div style="text-align: right;">Item</div></p> <p>0.2 Health and Safety Training. Implementation and maintenance of Training</p> <p>Fixed: _____ Value related: _____ Time related: _____ <div style="text-align: right;">Item</div></p> <p>0.3 Personal Protective Clothing and equipment. Maintenance of Personal Protective Clothing and Equipment</p> <p>Fixed: _____ Value related: _____ Time related: _____ <div style="text-align: right;">Item</div></p>	

SCHEDULE NO 1: PRELIMINARY AND GENERAL (SECTION C)

ITEM	DESCRIPTION	AMOUNT
	<p>0.4 Fences, Signs and Barricades. Maintenance of Fence, Signs and Barricades</p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p> <p>0.5 Establishment of Safety Administration. Implementation and maintenance of Safety Administration</p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p> <p>0.6 Other Health and Safety Fixed-charge Obligations. Other Health and Safety Time-Related Obligations</p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>	

SCHEDULE NO 1: PRELIMINARIES AND GENERAL

COLLECTION		Page	AMOUNT
Item			
	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		Page	AMOUNT
Item			
	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		Page	AMOUNT
Item			
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	

EACH ITEM CARRIED TO COLLECTION

SCHEDULE NO 2: STRUCTURAL AND BUILDING RELATED REPAIR WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN-TITY	RATE	AMOUNT
BA.11	200.00	<u>STRUCTURAL AND BUILDING</u>				
	201.00	<u>BA : ROOFS</u>				
BC.02.01	201.01	<u>Rehabilitation:</u>				
		.01 Roof rehabilitation	m ²	600		
BB.02	201.02	<u>Waterproofing system:</u>				
		.01 Items measured by square metre:				
BB.02		.01 Pure acrylic emulsion waterproofing paint with polyester membrane or glass-fibre tissue waterproofing sealing system.	m ²	15		
	202.00	<u>BB: CARPENTRY</u>				
BB.02	202.01	<u>Ceilings:</u>				
		.01 Pre-painted "OWA" Mineral fibre acoustic suspended ceiling tiles or similar approved on "OWA" pre-painted exposed tee suspension system, including main and cross tees, necessar hangers, grids, etc. hung from steel purlins:				
BB.04		.01 600 mm x 1200 mm x 15 mm thick pre-painted tiles	m ²	10		
	202.02	<u>Alterations and repairs to existing structures:</u>				
SANS 1200 DA 8.3		.01 Remove:				
		.01 Suspended ceiling 600 x 1200mm including all main tees, cross tees and ancillary items.	m ²	10		
8.3.2	203.00	<u>BD: WALLS</u>				
		<u>EARTHWORKS (SMALL WORKS)</u>				
8.3.4	203.01	<u>Scheduled Items:</u>				
		.01 Excavate for restricted foundation, footings and trenches in all materials and use for backfill or embankment or dispose	m ³	35		
		.02 Extra over item 203.01.01 above for:				
		.01 Intermediate excavation	m ³	15		
		.03 Break up, hack of and remove existing concrete	m ³	5		
		.04 Importing, placing and compacting approved G7 material in layers of 150mm from commercial sources or from borrow pits to 93% MOD AASHTO	m ³	10		
	Carried forward					

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
	Brought forward					
SABS 1200 G 8.4	204.00	<u>CONCRETE (STRUCTURAL)</u> <u>SCHEDULED CONCRETE ITEMS</u>				
8.4.3	204.01	Strength concrete:				
		.01 Class 25 MPa / 19mm concrete	m ³	3		
BD.04	204.02	Ironmongery, steelwork, glass, wall finishings, etc.:				
		.01 6mm thick mirror glass 450mm x 600mm wide	No	6		
		.02 Plastic bun foot, dome, 50 x 43mm black fitted to underside of tabs and chairs	No	640		
		.03 150mm Natural Anodized Aluminium disabled sign type B2312 or similar approved	No	3		
		.04 150mm Natural Anodized Aluminium male sign type B2313 or similar approved	No	2		
		.05 150mm Natural Anodized Aluminium female sign type B2314 or similar approved	No	2		
		.06 Defy 600mm slimline touch control ceran hob and oven	No	1		
		.07 Items measured by linear metre:				
		.01 Silicone sealant in 6 mm contact joint between sanitary fittings and wall	m	40		
		.02 Ceasarstone Quartz countertops 30mm thick code:3040 Titan for bathroom wash hand basins as per DWG 0534-02-03, (WHB measured elsewhere)	m ²	5		
BD.04		.08 Items measured by area:				
		.01 Allow a PC amount of R 350,00/m2 for supply only of porcelain tiles fixed with adhesive to bedding (bedding elsewhere) and flush pointed with tinted waterproof jointing compound:				
		.01 On walls	m ²	50		
		.02 110 mm thick brick walls	m ²	10		
		.03 230 mm thick brick walls	m ²	10		
		.04 Internal cement plaster to walls	m ²	20		
		.05 External cement plaster to walls	m ²	20		
		.06 30mm thick Ceasarstone Quartz countertops code:3040 Titan for classrooms	m ²	70		
	Carried forward					

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
		Brought forward				
BD.05		.08 Remove:				
		.01 Mirror glass 450mm x 600mm wide	No	7		
		.02 15 mm roller ball catch with striking plate	No	20		
		.09 Break out/hack up/demolish and remove:				
		.01 External plaster to walls	m ²	20		
		.02 Internal plaster to walls	m ²	20		
	205.00	<u>BH: FITTINGS</u>				
BH.01 BH.02	205.01	Steelwork and joinery:				
		.01 Items measured by number:				
		.01 Kitchen cupboard. Carcase to be manufactured from white Bison "A" grade board with high impact edging. Backing to be 5mm white hardboard. Doors to be 16mm melamine Handles to be 10mm dia X 190mm stainless steel bar handles. Door hinges to be "Blum" or similar approved.				
		.01 Type A: Bottom unit size 1400 mm wide x 600 mm x 900 mm high with three doors, and one shelf. Carcase to be on 150mm high adjustable legs. Cupboard plinth to be cherry royale melamine. 30mm thick Ceasarstone quartz counter tops to cupboard to have 180 degree edge and shall be waterproof.	No	2		
BH.01 BH.02		.02 Type B: Bottom unit size up to 1500 mm x 600 mm x 900 mm high with two doors with one shelf and one section for 4 drawers (500 wide x 200 high x 500 deep mounted on full extension telescopic runners. Carcase to be on 150mm high adjustable legs. Cupboard plinth to be aluminium (Raiel or similar approved). 30mm thick Ceasarstone quartz counter tops to cupboard to have 180 degree edge and shall be waterproof. Drawer fronts to be Cherry Royale melamine	No	2		
		.03 Type C: Bottom unit size up to 5500 mm x 600 mm x 900 mm high with eight doors with one shelf and two sections for 4 drawers (500 wide x 200 high x 500 deep mounted on full extension telescopic runners. Carcase to be on 150mm high adjustable legs. Cupboard plinth to be aluminium (Raiel or similar approved). Ceasarstone quartz counter tops to cupboard to have 180 degree edge and shall be waterproof. Drawer fronts to be Cherry Royale melamine	No	3		
		Carried forward				

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
		Brought forward				
		.04 Type D: Bottom unit size up to 11000 mm x 600 mm x 900 mm high with eighteen doors one shelf and two sections for 4 drawers (500 wide x 200 high x 500 deep mounted on full extension telescopic runners. Carcase to be on 150mm high adjustable legs. Cupboard plinth to be aluminium (Raiel or similar approved). Ceasarstone quartz 30mm thick counter tops to cupboard to have 180 degree edge and shall be waterproof. Drawer fronts to be Cherry Royale melamine	No	1		
		.05 Type E: Bottom corner unit size: 900mm x 900 mm x 600mm with two doors and one shelf Height: 900mm Carcase to be on 150mm high adjustable legs. Cupboard plinth to be cherry royale melamine. 30mm thick Ceasarstone quartz counter tops to cupboard to have 180 degree edge and shall be waterproof.	No	3		
		.06 Type F: Top unit size up to 5500 mm x 300 mm x 900 mm high with ten doors and one shelf.	No	3		
		.07 Timber shelving 580 x 20mm thick	m	10		
		.08 Stainless steel shelving 300 x 20mm thick including heavy duty stayed bracket at 500mm centres	m	20		
		.02 Items measured by linear metre:				
		.01 SA Pine shelving, 250 x 22mm shelving on 'Shelco' or similar approved adjustable wall bands and brackets at approximatley 500mm centres, etc, fixed complete	m	20		
BJ.02	205.02	Paint to previously painted surfaces:				
		.01 Plaster surfaces:				
		.01 Prepare surfaces and remove all loose material, apply one coat alkali resistant plaster primer and two coats interior acrylic emulsion paint with smooth sheen appeal:				
		.01 Walls	m ²	40		
BF	206.00	<u>PEST CONTROL</u>				
PSA 8.6		.01 Preventative Pest Control	Sum		-	20 000.00
		.02 Charge required by Contractor on sub item .01 above	%	20000 %	
		TOTAL SCHEDULE NO 2: CARRIED TO SUMMARY: REPAIR WORK				

SCHEDULE NO 3: PLUMBING AND DRAINAGE RELATED REPAIR

PAYMEN REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
PAA 05 PAA.03	300.00	<u>PLUMBING AND DRAINAGE</u>				
	301.00	<u>DETAIL WORK</u>				
PAA.03	301.01	Isolation, stripping, dismantling and removal of existing brassware, sanitary ware and piping:				
		.01 Water closets:				
		.01 Vitreous china WC pan (cistern type)	No	3		
		.02 Vitreous china WC cistern	No	8		
		.03 Flushing mechanisms	No	4		
		.04 Tailpipe connections to WC, including shut of valve	No	8		
		.05 Pan connector	No	8		
		.06 Toilet seat and cover	No	8		
		.02 Wash hand basins:				
		.01 Vitreous china wall-mounted wash hand	No	2		
		.02 15 mm ø pillar taps and mixers	No	8		
		.03 15 mm ø pipe connections to pillar taps	No	10		
		.04 Rubber flexi p-trap or CP bottle trap	No	10		
		.05 PVC wall mounted waste pipes	m	32		
		.06 Copper pipes	m	33		
		.03 Showers:				
		.01 Under tile stop cocks	No	4		
		.02 Shower gratings	No	2		
PAA.03		.04 Sinks and Wash troughs:				
		.01 Porcelain sink	No	5		
		.03 15mm sink mounted raised tap	No	5		
		.04 Rubber flexi p-trap or CP bottle trap	No	12		
		.05 Urinals:				
		.01 Rubber flexi p-trap or CP bottle trap	No	9		
		.06 External:				
		.01 20mm dia. RB hose bip tap	No	2		
	Carried forward					

SCHEDULE NO 3: PLUMBING AND DRAINAGE RELATED REPAIR

PAYMEN REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
	Brought forward					
PAA.05	301.02	Supply and installation of sanitary ware and brassware: .01 Water closets: .01 Vitreous china WC pan - white paraplegic low level suite .02 Vitreous china WC cistern - white 9 litres complete with lid and fitments .02 Wash hand basins: .01 Starna SQ basin 465 x 375 x 135mm NTH- WHITE code: YWBST08A .02 CP Bottle trap with 75mm deep re-seal and adjustable telescopic pipe. .03 15 mm ø CP pillar taps SANS 226, JASWIC Listed .04 "Grohe" Euroeco cosmopolitan T self closing Bib tap, flow rate of 5.7 l/min, adjustable flows times and includes facucet .03 Sinks and wash troughs: .01 Vaal or similar approved 600 x 400 x 200mm Lab Sink .02 Sink mounted chrome IQ plus sink mixer deck type code:TAP-DID-IQPL-CH-002 .03 Plug and chain for WHB .04 Flexi rubber P-trap .04 Showers: .01 5 Function water saving shower rose with a spray rate of 9 l/min .02 15 mm ø under-tile Cobra FSTAF1S5-0GT01 star concealed stop-cocks .03 CP shower grating .04 15mm CP shower arm with fascia plate and male iron connection	No	1		
	Carried forward					

PAYMEN REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
		Brought forward				
PAA.06	301.03	.05 Urinal: .01 Duravit "Durastyle" waterless urinal 340 x 300mm with a 50mm dia horizontal outlet .02 Duravit urinal spray cleaner 6x500ml .06 External: .01 20mm Hose bip tap, rough brass, with BSP hose union - SANS 226 Type 2 (BS 1010), JASWIC Listed Supply and installation of above ground sanitary drainage piping installation: .01 uPVC soil and waste pipes: .01 110mm ø soil pipe fixed to walls and soffits .02 uPVC soil and waste pipe fittings: .01 50 mm dia. plain bend 87.5° .02 50 mm dia. access bend 87.5° .03 50mm dia. plain bend 135° .04 50mm dia. access bend 135° .05 50mm junction plain 87.5° .06 50mm junction access heel 87.5° .07 110mm dia. plain bend 135° .08 110mm dia. access bend 135° .09 110mm dia. access bend 95° .10 110mm dia. plain bend 95° .11 110mm vent horn bend access heel 95° .12 110mm junction single access heel 95°	No No No m No No No No No No No No No No No No	3 1 2 11 4 1 9 9 3 9 14 14 14 14 14 14		
PAA.06	301.04	Supply and installation of underground sanitary drainage installation: .01 Pipe trench excavations, bedding and backfilling: .01 Excavate in all materials for pipe trenches to depth of 1100 mm x 600 mm wide	m³	11		
(LI)						
		Carried forward				

SCHEDULE NO 3: PLUMBING AND DRAINAGE RELATED REPAIR

PAYMEN REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
		Brought forward				
(LI)		.02 Supply and installation of pipe bedding for flexible pipes of compacted selected granular material as well as compacted selected fill material by importation from commercial sources if so required.	m ³	23		
(LI)		.03 Backfilling and compacting to 93% modified AASHTO density with selected material	m ³	11		
		.02 uPVC Solid wall sewer pipes Class 34 - 300 kPa to SANS 791 specifications:				
		.01 110 mm dia.	m	24		
		.03 uPVC soil and waste pipe fittings:				
		.01 110 mm ø plain bend 87,5°	No	1		
		.02 110 mm ø plain bend 135°	No	1		
		.03 110 mm ø square double junction	No	1		
		.04 110 mm ø 135° junction	No	6		
		.05 110 mm ø 90° junction	No	7		
		.04 Cleaning eyes:				
		.01 100 mm ø inline cleaning eye, constructed complete with Square inspection eye cast iron cover and frame Type 14A (SANS 558) daylight opening size 295 x 295mm and 500 x 500 x 75mm thick concrete encasement	No	1		
PAA.07	301.05	Supply and installation of domestic water piping installation:				
		.01 Copper piping Class 0 SANS 460 with capillary soldered type joints for hot and cold-water piping chased in walls including wrapping of pipes with builders paper, chasing and reinstatement of chased surfaces:				
		.01 28 mm ø including fittings	m	1		
		.02 22 mm ø including fittings	m	1		
		.02 Supply and installation of Class 6 pressure HDPE piping, including fittings, jointing and				
		.01 20 mm ø HDPE pipe, including fittings	m	30		
		.03 Replace 20 mm ø shut-off ball-o-stop valve	No	2		
		Carried forward				

SCHEDULE NO 3: PLUMBING AND DRAINAGE RELATED REPAIR

PAYMEN REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
	Brought forward					
PAA.08	301.06	Supply and installation of domestic geyser installations including shut-off valves, strainers, non-return valves, expansion relief valve, safety valve, drain piping and electrical .01 SANS151 dual 150 litre, 3 kW 600kPa approved geyser	No	1		
PAA.11	301.07	Servicing, overhauling and cleaning of brassware: .01 Replace washers on brassware with washer kits: .01 15 or 22 mm ø CP pillar taps .02 20 mm ø brass hose bib taps .03 15 or 22 mm CP sink mixers	No No No	8 2 1		
PAA.12	301.08	Servicing, cleaning and repair of domestic water and drainage pipe installations: .01 Servicing and repair of drainage installations: .01 Unblock and clean pipe work including fittings, 50 mm ø pipe .02 Unblock and clean pipe work including fittings, 100 mm ø pipe .03 Replace damaged gully with pre-cast concrete gully .04 Replace missing or broken square cast iron gully gratings 250mm x 250mm wide	m m No No	200 170 4 2		
PAA.13	301.09	Servicing, cleaning and repair of domestic geysers, including replacement of element, thermostat, safety valve and vacuum breakers and rectifying of pipe work where necessary: .01 150 litre electric geyser	No	1		
CF.01.03	301.10	Manhole covers and grid inlets: .01 Replacement of manhole covers, grid inlets, etc.: .01 SANS 558 Type 9E - Medium Duty Class Square Manhole Covers and (Square Base) Frame, Double Seal Type 900 mm x 900 mm wide:	No	2		
	Carried forward					

SCHEDULE NO 3: PLUMBING AND DRAINAGE RELATED REPAIR

PAYMEN REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
	Brought forward					
CJ.05	302.00	<u>SUPPLY OF EQUIPMENT FOR ABLUTIONS</u>				
CJ.05.01		.01 Stainless Steel Hand dryer unit with blower output of 450 watt @ 20 000 rpm similar or equal to accelerator	No	2		
CJ.05.05		.02 Stainless steel 400ml hand spray foam soap dispenser with anti vandal stainless steel	No	6		
CJ.05.08		.03 Stainless steel 20L square Wall Bin	No	2		
	302.01	Subsoil Drainage				
		.01 19mm crushed stone packed inside a filter blanket around a drainage pipe (blanket and pipe measured elsewhere)	m ³	10		
		.02 A2 geofabric filter blanket wrapped around stone encasing or pipe with 150mm side and 300mm end laps, including stitching	m ²	18		
		.03 Non-woven geotextile A2 filter blanket wrapped around stone encasing or pipe with 150mm side and 300mm end laps, including stitching	m ²	20		
		.04 110mm slotted pipes laid in stone encasing (encasing elsewhere)	m	3		
	302.02	Supply deliver and install Water meter station including strainer and one shutt-off valve with plastered brickwork chamber and 450mm x 450mm cast iron manhole cover				
		.01 32mm dia.	No	1		
		.01 32mm dia Pressure reducing valve	No	1		
	TOTAL SCHEDULE NO 3: CARRIED TO SUMMARY: REPAIR WORK					

SCHEDULE NO 4: BUILDING ELECTRICAL RELATED REPAIR WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
AB.01.02	400.00	<u>BUILDING ELECTRICAL REPAIR WORK</u>				
	401.00	<u>DISTRIBUTION BOARDS</u>				
AB.01.02	401.01	Replace distribution board:				
		.01 Surface mounted Main Distribution Board complete with circuit breakers as per drawing 0534/03/04	No	1		
AB.01.13		.02 Surface mounted Building Distribution Board with essential and non essential section as per drawing 0534/03/05	No	1		
	401.02	Supply and installation of circuit breakers (SABS approved):				
AB.01.13		.01 5-10A, 6kA single pole	No	3		
		.02 10-30A, 6kA single pole	No	6		
AB.01.13		.03 10-40A, 6kA single pole	No	2		
		.04 10-40A, 6kA triple pole	No	1		
AB.01.14	401.03	Supply and installation of isolators (SABS approved):				
		.01 60A, 6kA double pole	No	1		
AB.01.14		.02 60A, 6kA triple pole	No	1		
	401.04	Supply and install contactors:				
AB.01.15		.01 30A, 3 pole	No	1		
AB.01.16	401.05	Supply and install switching timers:				
		.01 Electronic QAT-R-type time switch with 24hr time reserve	No	1		
AB.01.17	401.05	Supply and install earth leakage units (SABS approved):				
		.01 60A, 5kA double pole	No	1		
AB.01.19	401.06	Supply and install surge arrestors:				
		.01 3 Pole and Neutral 275V 5kA with indication	No	1		
AB.01.11	401.07	Supply and install earth continuity conductor:				
		.01 50 mm ² BCEW	m	10		
		.02 9.5 mm ² aluminium	m	30		
	Carried forward					

SCHEDULE NO 4: BUILDING ELECTRICAL RELATED REPAIR WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
	Brought forward					
AB.01.12	401.08	Terminate earth continuity conductor: .01 50 mm ² BCEW .02 9.5 mm ² aluminium	No No	6 12		
	402.00	<u>WIRING</u>				
AB.01.04	402.01	Replace wiring : .01 2,5 mm ² PVC insulated .02 4 mm ² PVC insulated .03 6 mm ² PVC insulated .04 10 mm ² PVC insulated .05 2,5 mm ² BCEW .06 4 mm ² BCEW .07 6mm ² BCEW .08 4 mm ² 3 core surfix cable .09 2.5 mm ² 3 core surfix cable	m m m m m m m m m	250 100 100 100 100 50 50 20 40		
	403.00	<u>LIGHTING INSTALLATION</u>				
AB.02.02	403.02	Service luminaire: .01 Type 3X36W LLB Flush Mounted	No	9		
AB.02.03	403.03	Replace luminaire: .01 Type D: 600X600 40W/36W 4000K LED Side Lit Panel Surface mounted complete with Acrylic PFFMA Diffuser, 3m cord set and 5A plug top, flicker free driver and minimum 50000 Life Hours. Type Genesis One LED Panel 600x600 36W or similar .02 Type E: 600X600 Emergency 40W/36W 4000K LED Side Lit Panel Surface mounted complete with Acrylic PFFMA Diffuser, 3m cord set and 5A plug top, flicker free driver and minimum 50000 Life Hours. Type Genesis One LED Panel 600x600 36W or similar approved	No No	2 2		
	Carried forward					

SCHEDULE NO 4: BUILDING ELECTRICAL RELATED REPAIR WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
	Brought forward					
		.03 Type H 1200X600 LED Panel Recessed mounted complete with 400K 48W LED's Acrylic PFFMA Diffuser (Opal), 3m cord set and 5A plug top Type Genesis One LED Panel 1200x600 48W or similar approved	No	2		
AB.02.07	403.04	Service light switch (all types)	No	20		
AB.02.04	403.05	Replace light switch:				
		.01 16A, one lever, one way	No	5		
		.02 16A, two lever, one way	No	3		
AB.02.05	403.06	Replace Photo-electric switch:				
		.01 16A unit with bracket and mounted in dummy bulkhead fitting	No	1		
AB.02.09	403.10	Replace lamp holder (Ceramic)	No	2		
	404.00	<u>POWER OUTLETS</u>				
AB.03.07	404.01	Service socket outlet:				
		.01 16A, single SSO	No	16		
		.02 16A, double SSO	No	30		
AB.03.01	404.02	Replace socket outlet:				
		.01 16A, single SSO	No	10		
		.02 16A, double SSO	No	8		
		.03 16A, single SSO power skirting mounted	No	5		
		.04 16A, dedicated SSO power skirting mounted	No	5		
		.04 16A, single SSO with two switched Euro sockets	No	2		
AB.03.08	404.03	Service isolator:				
		.01 60 A, 2 pole	No	3		
AB.03.02	404.04	Replace isolators:				
		.01 30A, 2 pole	No	1		
	Carried forward					

SCHEDULE NO 4: BUILDING ELECTRICAL RELATED REPAIR WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
	Brought forward					
AB.03.19	405.00	<u>FIXED APPLIANCE AND COMPONENTS</u>				
	405.01	Replace geyser components:				
		.01 Replace domestic geyser element	No	1		
		.02 Replace geyser thermostat	No	1		
AB.03.06	405.02	Replace connection from isolator to fixed appliance, with flexible copex (Sprague) conduit and conductors, e.g. stove or geyser :				
		.01 Stove : 2 x 6 mm ² PVC and 2,5 mm ² BCEW conductors.	No	1		
		.02 Geyser : 2 x 4 mm ² PVC and 2,5 mm ² BCEW conductors.	No	1		
AB.03.04	406.00	<u>WIRE WAYS CONDUITS AND ACCESSORIES</u>				
	406.01	Replace conduit :				
		.01 20 mm dia. Galv. Steel	m	40		
		.02 20mm PVC Surface Mounted	m	20		
		.03 20mm PVC Chased in walls	m	10		
AB.03.12	406.02	Supply and install draw box cover plates (white enamel) to fit:				
		.01 100 x 50 box	No	3		
		.02 100 x 100 box	No	5		
		.03 Circular galvanised box	No	4		
		.04 Circular PVC box	No	1		
AB.03.20	406.03	Supply and install 4 plate stove with oven and warm drawer similar or equal to Defy 621	No	1		
AB.04.01	407.00	<u>EARTHING AND BONDING</u>				
	407.01	Supply and install earthing and bonding in all ablution rooms, laundries and kitchens	Sum	-		-
	Carried forward					

SCHEDULE NO 4: BUILDING ELECTRICAL RELATED REPAIR WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
	Brought forward					
	408.00	<u>LIGHTNING PROTECTION</u>				
AB.04.03	408.01	Supply and install earth electrodes:				
		.01 16 mm dia. 1.2 m long Cu rod and clamp	No	10		
AB.04.04	408.02	Provide cadweld joint on 50 mm² cable	No	10		
AB.04.05	408.03	Earth building roof structure	No	2		
AB.04.02	408.04	Testing of lightning earthing by a specialist contractor and provide earthing	Sum	-	-	
AB.03.21	408.05	Provide Certificate of Compliance for the Installation as required on instruction from the Engineer	No	1		
AB.01.03	408.06	Supply and delivery of PVC/SWA/PVC/ECC Cu low-voltage cable:				
		.01 16 mm ² , 4-core	m	20		
		.02 6 mm ² , 4-core	m	20		
AB.01.11	408.07	Supply, delivery and install bare copper earth conductor				
		.01 10 mm ²	m	20		
		.02 4 mm ²	m	20		
	408.08	Lay/Install PVC/SWA/PVC/ECC Cu LV cable:				
		.01 16 mm ² , 4-core	m	20		
		.02 6 mm ² , 4-core	m	20		
AB.01.12	408.09	Termination of PVC/SWA/PVC Cu LV cable:				
		.01 16 mm ² , 4-core	No	2		
		.02 6 mm ² , 4-core	No	2		
AB.01.07	408.10	Excavate in all materials for trenches, backfill, compact and dispose of surplus	m ³	30		
	408.11	Supply and install cable sleeves				
		.01 50mm ø PMA PCL flexible plastic complete with bends	m	80		
	TOTAL SCHEDULE NO 4: CARRIED TO SUMMARY: REPAIR WORK					

SCHEDULE NO 5: PV INSTALLATION

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
PVS 12	500.00	<p><u>PV INSTALLATION</u></p> <p><u>Providing the required materials, equipment, tools, machines and skilled labours for providing and installing a grid tie Photovoltaic system with backup set for a production capacity of 93kWh/d .Built-in MPPT to accommodate 36x 575W mono solar panels, Grid/Generator automatic start, Built-in fuse box. Monitoring and data Storage and Operator panel) consisting of Solar Panels, Solar Racks, Smart Invertor(s), Regulators, Connection Cables, Plugs and Sockets ...etc as Main / Stand-by Power Sources that supply power during the day and according to the below item descriptions/specifications. The mode of operation is that the System must always operate from solar and the excess power generation from the Solar panels charging the battery bank. Any additional power generated over and above the building use and battery bank will be supplied back into the local power grid. If the solar production is too low or unavailable it should have an automatic compensation/changeover to work from grid power with possibility of full programming and monitoring. Contractor shall be required to complete a detailed design; producing</u></p> <p><u>a design that will service Gold Fields Educational Centre (historic power consumption 93kWh/d) with battery bank that can provide power for all times during a normal day during which the Solar panels cannot directly meet the demand of the building. Additionally the power bank must be able to meet the demand of the building in the event of grid power failure and lack of PV power generation for a period of 8 hours during working hours plus the overnight power requirements. The design must be NRS 097-2-3 compliant.</u></p>				
	Carried forward					

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
	Brought forward					
PVS 12.01	501.00	<u>HYBRID PV SYSTEM</u>				
	501.01	Supply and Install Hybrid PV System with Battery Back-Up. The Scope of Works is as follows: 1. Supply and Installation of 36X 575W Solar Panels mounted on steel carport structure 2. Supply and Installation of DC Protection Box 3. Supply and Install Solar Mounting System P1000T galvanized trunking, mid clamps and end clamps 4. Supply and Installation of 6mm² Single Core Solar Photovoltaic PV 1000V VDC Cables between DC Protection box and DC D.B in PVC sleeves 5. Earthing and Lighting Protection of the System 6. Supply and Install AC D.B and DC D.B 7. Supply and Install 12kW Three Phase Hybrid Inverters (Solar/Battery/Grid) with smart load and associate cabling 8. Supply and Install 20kWh Lithium-Ion life PO4 Batteries and associate cabling and DC Fuses 9. SSEG Application and Registration 10. Provide Shop Drawings and Wiring Diagrams 11. Testing and Commissioning of the System	PC Sum	-	-	600 000.00
	501.02	Attendance and profit on item above	%	600 000.00 %	
	TOTAL SCHEDULE NO 5: CARRIED TO SUMMARY: REPAIR WORK					

SCHEDULE NO 6: CIVIL RELATED REPAIR WORK

PAYMEN REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
CA.05.01	600.00	<u>ROAD AND STORMWATER REPAIRS</u>				
	601.00	<u>CONCRETE BLOCK PAVEMENTS AND WALKWAYS</u>				
	601.01	Remove paving blocks:				
		.01 Pickup, stockpile, clean and store masonry paving one side	m ²	10		
SANS 1200 MJ	602.00	<u>CONCRETE BLOCK PAVEMENT</u>				
	602.01	Paving				
		.01 Relay concrete paving from stockpile on 50mm thick river sand bed with sand and cement mixture swept into joints and hosed down including preparation of ground or filling	m ²	10		
	TOTAL SCHEDULE NO 6: CARRIED TO SUMMARY: REPAIR WORK					

SCHEDULE NO 7: CONVENTIONAL FIRE FIGHTING EQUIPMENT AND FIRE DETECTION REPAIR WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
	700.00	<u>INSTALLATION A12: CONVENTIONAL FIRE FIGHTING EQUIPMENT</u>				
	701.00	<u>GENERAL</u>				
PJC.14	701.01	Labelling of all conventional fire fighting equipment with identifying tags and recording of details:				
		.01 Fire extinguishers	No	6		
PJC.13	701.02	Supply and Installation of Fire Equipment Signage:				
		.01 Photo luminescent escape and fire fighting equipment signs installed complete with, aluminium frame, mountings, brackets, etc.:				
		.01 190mm x 190mm	No	5		
		.02 190mm x 384mm	No	20		
		.03 190mm x 578mm	No	1		
		.02 Silk-screened escape and fire fighting equipment signs installed complete with aluminium frame, mountings, brackets, etc.:				
		.01 190mm x 190mm	No	5		
		.02 190mm x 384mm	No	4		
		.03 190mm x 578mm	No	1		
	702.00	<u>SERVICE OF EQUIPMENT AT START OF THE CONTRACT</u>				
PJC.09	702.01	Provide Full service of Fire Extinguishing Equipment units according to the manufacturer's specification:				
PJC.09		.01 Servicing, cleaning, and repair of 9kg STP fire extinguishers:	No	6		
PJC.09		.02 Servicing, cleaning, and repair of 4.5kg STP fire extinguishers:	No	4		
PJC.09		.03 Servicing, cleaning, and repair of 6kg CO ² fire extinguishers:	No	1		
PJC.09		.04 Replace missing fire extinguisher cabinet key.	No	2		
PJC.09		.05 Replace broken 3mm thick fire extinguisher glass.	No	2		
	Carried forward					

SCHEDULE NO 7: CONVENTIONAL FIRE FIGHTING EQUIPMENT AND FIRE DETECTION REPAIR WORK

PAYMENT REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
	Brought forward					
PJC.11		.06 Fire Fighting Training	No	1		
PJC.10		.07 Complilation of a fire plan for building	No	1		
	703.00	<u>OPERATING AND MAINTENANCE MANUALS:</u>				
SB 06.01	703.01	Supply and deliver operating and maintenance manual to submit a complete set of operating and maintenance manuals:				
		.01 Fire Detection System (O&M Manual & Drawings)	Sum	-	-	
		.02 Block plans Laminated and installed in Aluminium Clipper Frames	No	6		
		.03 Log Book Holder	No	1		
	704.00	<u>COMMISSIONING</u>				
SC 12.03	704.01	Commissioning and testing of the installation				
		.01 Fire Detection System	Sum	-	-	
		.02 Supply and Install Power Cabling to Fire Panel Provide all the Neccesarry Certification, Intergate the Panel with HVAC System.	PC Sum	-	-	15 000.00
		.03 Contractors profit and attendance on sub item ,02	%	15000 %	
	TOTAL SCHEDULE NO 7: CARRIED TO SUMMARY: REPAIR WORK					

SCHEDULE NO 8: HEATING VENTILATION AND AIRCONDITIONING

PAYMEN REFERS TO	ITEM NO	DESCRIPTION	UNIT	QUAN- TITY	RATE	AMOUNT
	800.00	<u>HEATING, VENTILATION, AND WORK</u>				
	800.01	Allow for commissioning (as directed by the Engineer) of Heat Recovery Ventilation (HRV) unit to recover heat from exhaust air to transfer incoming fresh air of existing installation.	PC Sum	-	-	12 000.00
	800.02	Attendance and profit on item above	%	12 000.00 %	
	801.00	Supply and Install Power Cabling to HVAC System,Provide all the Neccesarry Intergate the Panel with Fire Panel.	PC Sum	-	-	15 000.00
	801.01	Contractors profit and attendance on item above	%	15000 %	
	TOTAL SCHEDULE NO 8: CARRIED TO SUMMARY: REPAIR WORK					

TENDER NO: G550/2025

SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE

REQUEST FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE
GOLDFIELDS EDUCATION CENTRE FOR THE SANBI AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE
TOWN

SUMMARY OF SCHEDULE OF QUANTITIES: REPAIR WORK

SCHEDULE NO 1:	PRELIMINARY AND GENERAL	R
SCHEDULE NO 2:	STRUCTURAL AND BUILDING RELATED REPAIR WORK	R
SCHEDULE NO 3:	PLUMBING AND DRAINAGE RELATED REPAIR WORK	R
SCHEDULE NO 4:	BUILDING ELECTRICAL RELATED REPAIR WORK	R
SCHEDULE NO 5:	PV INSTALLATION	R
SCHEDULE NO 6:	CIVIL RELATED REPAIR WORK	R
SCHEDULE NO 7:	CONVENTIONAL FIRE FIGHTING EQUIPMENT AND FIRE DETECTION SYSTEM	R
SCHEDULE NO 8:	HEATING VENTILATION AND AIRCONDITIONING	R
CONTINGENCY		R 250 000.00

**TOTAL OF SCHEDULE OF QUANTITIES - REPAIR WORK
CARRIED TO CALCULATION OF TENDER SUM**

R

TENDER NO: G550/2025

SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE

REQUEST FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION
WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SANBI AT THE KIRSTENBOSCH
NATIONAL BOTANICAL GARDEN, CAPE TOWN

CALCULATION OF TENDER SUM

TOTAL OF SCHEDULE OF QUANTITIES - REPAIR WORK R

SUBTOTAL R

VALUE-ADDED TAX (VAT)
The tenderer shall add 15% of the subtotal for value-added tax R

TENDER SUM CARRIED TO FORM OF OFFER AND ACCEPTANCE R

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

PART C: THE CONTRACT**Part C3: Scope of Work**

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION CONTRACT
CONTRACT NO:	SANBI G550/2025

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C3.2	CONSTRUCTION	152
C3.3	MANAGEMENT	154

PART C: THE CONTRACT

Part C3: Scope of Work

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN
CONTRACT NO:	SANBI G550/2025

C3.1. Description of the Works

C3.1.1 Employer's Objectives

The employer's objective is to deliver improved infrastructure in the Kirstenbosch National Botanical Garden.

C3.1.2 Overview of the Works

The project entails the renovation work to the Goldfields Education Centre at the Kirstenbosch National Botanical Garden, Cape Town.

C3.1.3 Extent of the Works

The Contractor will be required to construct the works in conformity with design criteria specified in the project's scope of work, part C3 of the tender document. The scope of works includes but is not limited to the following:

Structural and Building

Roofs

The roof will be inspected and repaired as needed by supplying and fixing new screws and sealants or sealer strips

Paintwork

Touch-up paintwork will be required after the installation of the photovoltaic unit.

Joinery

The cupboards have been damaged by water or fair wear and tear. All the damaged cupboards will be replaced with cupboards manufactured from Bison "A" grade board with high impact edging and 32 mm thick "post-form" top. The backing will be 5 mm white hardboard, whilst doors are 16 mm thick with 10 mm diameter x 190 mm stainless steel bar handles and a Ceasarstone Quartz countertop.

Kitchen cupboards will only be replaced in the kitchen, Lecture Room 1 and Lecture Room 2. The refurbished cupboard countertops will be replaced with new Ceasarstone Quartz countertops and silicone sealed. Damaged shelving will also be replaced as required.

Ironmongery

SA Pine shelving 250 x 22 mm thick will be fixed on to one side of the library wall with adjustable wall band at approximately 500mm centres, to provide additional storage for books.

A 450 x 600 x 6 mm thick mirror will be installed above each wash hand basin in the bathrooms.

Walls

The existing kitchen splash back tiles are to be removed, and new full body porcelain tiles are to be installed.

Ceilings

Damaged 1200 x 600 mm mineral fibre ceiling tiles in the offices are to be replaced.

Signage

Dilapidated male, female and disabled bathroom signage to be removed and new signage to be installed.

Pest Control

A provisional amount has been allocated for pest control to be executed at the building.

Plumbing and Drainage

All the bathrooms where alterations take place will receive new sanitary fixtures. The following work is planned:

- Remove the wash hand basins in Bathrooms 1, 2 and 5 and install new floating granite tops with mixer taps.
- Each bathroom to receive a Franke Rodan 0,8 mm or similar approved thick satin finish stainless steel paper towel and soap dispenser.
- Replace porcelain sinks in classrooms with stainless steel sinks with Cobra or similar approved single lever raised chrome basin mixer.
- Service all taps and mixer units that will not be replaced.
- Damaged copper and PVC piping to be replaced.

Electrical Building Works

The following work is planned under the electrical repair work:

- Service existing distribution board, provide labelling and legend card. Replacement of old Fuchs type circuit breakers. Install additional circuit breakers for power circuits to the hand dryers and other fixed equipment.
- Provide Certificate of Compliance on the electrical installation.
- Provide conduiting for cabling supplying the hand dryers.
- Service and secure all newly installed light fittings.
- Test and service all new socket outlets and connect them to the distribution board.
- Test and service all new light switches and ensure that they are connected correctly to the distribution board.
- Ensure the wiring is compliant with SANS 10142. All wiring should not be exposed to mechanical damage and all wiring in the ceiling space should run in conduits and trunking.
- All socket outlets, light switches and isolators will be labelled with PVC brother labels according to the circuit number in the D.B Board (C.B 10 DB A).
- Supply and install 600 x 600 mm panel LED lights to the new suspended ceilings in the classrooms.
- Check and repair earthing and bonding of the building and at all the ablutions, geysers, heat pumps and equipment.
- Add additional outside lights at certain places around the building for security purposes.

Photovoltaic (PV) System

- The new Main Distribution Board (MDB) will be installed in the caretaker's room, where the inverters will also be located.
- A new cable will be installed from the metering Distribution Board (DB) outside to the new Main DB. This cable must be measured and categorised under electrical works.
- The existing cable that supplies the old Main DB in the passage will be rerouted to the new Main DB.
- Currently, the stove, heat pump, and geyser are powered by the DB in the passage. The power supply to these appliances will be disconnected from the passage DB and reconnected to the non-essential side of the new Main DB. New power circuits will be installed, complete with isolators, for the existing equipment.
- The new Heating, Ventilation and Air Conditioning (HVAC) equipment will be connected to the non-essential section of the new Main DB.
- The existing DB in the passage will remain in place and function as an essential DB. The faceplate should be colour-coded for identification.
- Finally, circuits for lights, plugs, and equipment connected to the existing DB in the passage will be routed to the PV section.

PV Specifications

- Supply and install solar panels
- 575W high-efficiency, half-cell module, mono-percium modules JA Solar or Jinko panels or similar approved installed on steel carport structure. Solar panels to be earthed with 6 mm² PVC earth conductors between panels. Earth Wire to be connected to Earth Bar of DB.
- Supply and install double insulated and UV rated 6 mm² Single Core Solar Photovoltaic PV 1000 VDC Cable (Black & Red) between solar panels, DC Protection Box and D.C DB. Cabling to be installed in 50 mm PVC sleeve. Distance between DC Protection Box and inverter is +/- 70 m per string.
- Solar Mounting System
 - Supply and install P1000T Hot Dipped Galvanized Trunking (41,3 mm x 41,3 mm x 2,5 mm) that is installed on existing steel structure to mount solar panels.
 - Supply and install solar panel mid and end clamps for securing 575W solar panels to galvanized trunking.
- Solar Hybrid Inverters: 12kW
 - Install, test and commission: Sunsynk/Deye 12kW three phase Hybrid or similar approved inverter. Item to include all MPPT handling units as well as monitoring and intelligence associated to ensure operation according to Solar/Battery/Grid operation. The inverter must have a smart load option to connect non-essential equipment, such as the aircon, heat pump etc., to the inverter.
- Storage batteries Lithium-IonLife PO4
 - Supply and install
 - 20kWh Lithium-IonLife PO4 battery similar or equal to Freedom Won. To be approved.
 - Cabling, labelling and consumables etc. for connection between inverter and battery.
 - DC fuses and fuse holder for 20kWh Battery.
- Fuses, Isolators and Distribution Boards
 - Supply and install IP65 AC D.B complete with two 30A T.P circuit breakers, triple pole AC surge arrestor, 40A 3-way changeover switch.
 - Supply and install IP65 DC D.B complete with four 20A D.P PV circuit breakers, four double pole DC surge arrestors, four PV/DC fuse holders, four 20A PV fuses.
 - Supply and install IP65 Photovoltaic DC protection box (RAL 7032), double insulated for 10 string inputs and 10 string outputs. Protection box complete with 1000V DC Type I & II surge protection, 16A 4 pole 1000C DC MCB and M12 ventilation plug.
 - Supply and install 6 mm² 4-core armoured AC cabling between existing MDB and the AC D.B at the inverter. Length of cable +/- 10 m one way.

- Design & Registration
 - Single line diagram as well as shop drawings of the installation and associated documentation.
 - Application and registration of Small-scale Embedded Generation (SSEG) System at the City of Cape Town and sign off by a professional ECSA registered Engineer.
 - Please refer to the following link to the City of Cape Town approved PV installations: [PV Installation Specification](#)
 - The successful bidder will be expected to comply with the City of Cape Town SSEG requirements, failure to comply will result in the bid not being considered.
 - Excavate in all materials for trenches, backfill, compact and dispose of surplus material.
 - Supply and install cable sleeves 50 mm ø PMA PCL flexible plastic complete with bends.
- Testing and Commissioning
 - Test and commission complete hybrid (SSEG) PV system.

Civil Work

Pick up and relay paving where required for the PV cabling.
Edging of the paving steps where required.

Mechanical Works

Firefighting

The following work is planned under the fire protection systems repair and upgrade:

- Install new photo-luminescent escape and firefighting signage, complete with aluminium frames and mounting brackets.
- Install new silk-screened escape and firefighting signage as per fire safety regulations.
- Supply and install fire equipment signage throughout the building.
- Supply and install replacement extinguisher cabinet keys and 3 mm extinguisher glass panels where missing or damaged.
- Submit a complete set of operating and maintenance manuals, including block plans and fire detection layout drawings.
- Install laminated block plans in aluminium clipper frames and provide a logbook holder.
- Commission and test the complete fire detection system installation.
- Provide fire safety and firefighting training sessions for relevant personnel.
- Compile and submit a detailed fire plan for the building in line with the fire safety strategy.

Heating, Ventilation and Air Conditioning Works

The following work is planned under the HVAC scope:

- Commission the Heat Recovery Ventilation (HRV) unit to recover heat from exhaust air in compliance with energy efficiency requirements.

The project period will be **6 months (incl. the Builders Holiday)**.

C3.1.4 Location of the Works

The site is located at the Kirstenbosch National Botanical Garden (KNBG), Rhodes Drive, Newlands, Cape Town and includes all nursery structures.

C3.1.5 Description of Site and Access

Kirstenbosch National Botanical Garden lies in the heart of the Cape Floristic Region, also known as the Cape Floral Kingdom. It is the first botanic garden in the world to be included within a natural World Heritage Site.

The 36-hectare garden is part of a 528-hectare estate that contains protected mountainside supporting natural forest and fynbos along with a variety of animals and birds. The Kirstenbosch Estate borders the Table Mountain National Park, and the Garden merges seamlessly with the natural fynbos and forest of the mountain.

Kirstenbosch displays a wide variety of the unique plant life of the Cape Flora. Plants from all the diverse regions and biomes of southern Africa are also grown at Kirstenbosch, with over 7 000 species in cultivation.

The garden is accessible via Rhodes Drive, Newlands.

C3.1.6 Temporary Works

All design and construction of any temporary works must be approved by the Principal Agent.

PART C: THE CONTRACT

Part C3: Scope of Work

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
CONTRACT NO:	SANBI G550/2025

C3.2. Construction

C3.2.1 Construction Standards

The “Model Preambles for Trades (2008 Edition)” recommended and published by the Association of South African Quantity Surveyors shall be deemed to be incorporated in the Bills of Quantities, with amendments as follows: References to “Architect” in the Model Preambles are to be read as “Principal Agent” shall apply to this contract.

This publication is available from The Association of South African Quantity Surveyors, P.O. Box 3527, Halfway House, 1685 - telephone (011) 315-4140, before a Tender is submitted.

The SANS 1200 Standardised Specification for Civil Engineering Construction prepared by Standards South Africa and specific amendments and additions to the SANS 1200 Standardized Specifications shall apply to this contract.

The SANS 1200 Standardised Specification publications are available from Standard south Africa, Private Bag X 191, Pretoria, 0001.

C3.2.2 Plant and Materials

C3.2.2.1 Plant and Materials Supplied by the Employer

None

C3.2.2.2 Materials, Samples and Shop Drawings

All materials are to be tested by a commercial laboratory as directed by the Engineer.

C3.2.3 Construction Equipment

C3.2.3.1 Requirements for Equipment

The Contractor is required to use plant and equipment that is sufficient for the contract.

C3.2.3.2 Equipment Provided by the Employer

None

C3.2.4 Existing Services

C3.2.4.1 Known Services

As-built information is unavailable at the time of tender, the onus still lies with the main Contractor to ensure that no services are damaged during the construction phase.

C3.2.4.2 Treatment of Existing Services

Contractor to use caution.

C3.2.4.3 Use of Detection Equipment for the Location of Underground Services

At main Contractor's discretion.

C3.2.4.4 Damage to Services

It is the responsibility of the Contractor to ensure that no services are damaged during the construction process. In case the known services are damaged, the main Contractor shall be responsible for the repair of the services to the original state before it was damaged, as well as all cost associated with the damaged service.

C3.2.5 Site Establishment

C3.2.5.1 Services and Facilities Provided by the Employer

None.

C3.2.5.2 Facilities Provided by the Contractor

The onus lies with the main Contractor to find a suitable camp site, approved by the Employer.

C3.2.5.3 Storage

No requirements are specified.

C3.2.5.4 Other Facilities and Services

No requirements are specified.

C3.2.5.5 Vehicles and Equipment

No requirements are specified.

C3.2.5.6 Advertising Rights

It is the main Contractor's responsibility that no suppliers advertise on site. Any advertisement from suppliers shall be removed at the cost of the main Contractor.

C3.2.5.7 Notice Boards

Not Applicable.

C3.2.6 Site Usage

The Contractors are not allowed to work outside the allowed working hours, as agreed with the Engineer. The disturbance to the residence should be kept at a minimum.

PART C: THE CONTRACT

Part C3: Scope of Work

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
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C3.3. Management

C3.3.1 Planning and Programming

C3.3.1.1 General

This clause describes the requirements for the preparation, submission, updating and revision of the programme for the works. The requirements are in addition to or in expansion of the JBCC PBA clause [15.6].

The programme shall be used by the contractor to plan and execute the works. The programme shall also be used by the Principal Agent to monitor progress and be the sole basis for the assessment of revisions of the date for Practical Completion.

The programme shall be produced by the contractor as follows:

- a) A programme for the totality of the works shall be submitted to the principal agent for acceptance. If the principal does not accept such programme, it shall be revised and amended until it is accepted by the principal agent. This programme will then be regarded as the baseline programme.
- b) This baseline programme shall be updated with actual progress on a monthly basis, or any more frequent basis as necessitated by construction events. The contractor may submit to the principal for acceptance revisions to the baseline programme.
- c) Acceptance by the Principal Agent of any programme submitted by the contractor does not make such programme a contract document, nor does it mandate that the works shall be constructed strictly in accordance therewith. The contractor at all times remains responsible for the construction of the works.

C3.3.1.2 Submission of Programme

Within 10 (ten) working days of been given possession of the site the Contractor shall submit to the Principal Agent for his review and acceptance a programme for the whole of the works showing the order in which the contractor proposes to execute the works. This programme becomes the baseline programme upon acceptance by the Principal Agent. The baseline programme shall have regard to the contract completion dates, any other milestones and any restraints set out in the contract. Thereafter, if the actual progress does not conform with the baseline programme, the Principal Agent is entitled to require the Contractor to submit a revised programme showing the order of activities necessary to ensure completion of the works by the contract completion dates.

The Contractor shall supply the Principal Agent with an electronic copy of each programme, together with a print-out bar chart or tabular report in a pre-agreed format. All programmes shall be prepared and submitted using Microsoft Project software.

Within 10 (ten) working days of the contractor submitting a programme complete with all the information required by this clause to the principal agent for acceptance, the principal agent will accept the programme or state reasons for not accepting the programme. If such reasons are given, the contractor shall take account of the reasons and resubmit the programme within 5 (five) working days.

If the Principal Agent fails to act the programme is deemed to be rejected.

C3.3.1.3 Default in submission of programs

Should the contractor fail to submit a programme for acceptance as the baseline programme or not update the programme as described above, the principal agent shall be entitled to withhold 25% of the amount due to the contractor in interim payment certificates until the contractor has complied with its obligations in this regard.

C3.3.2 Health and Safety

C3.3.2.1 Health and Safety specification

In terms of the Occupational Health and Safety Act (Act 85 of 1993) (OHSA) and the Construction Regulation 2014, the Client must provide the Contractor with a Health and Safety Specification to which the Contractor must respond with a Health and Safety Plan for approval by the Client.

The purpose of this Specification is to ensure that Principal Contractors entering into a contract with the Employer maintain an acceptable level of performance with regard to health and safety issues during the performance of the contract. In this regard the OHSA Specification form an integral part of the Contract and the Principal Contractor shall ensure that their contractors and/or suppliers comply with the requirements of this Specification.

PART C: THE CONTRACT

Part C4: Site Information

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
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C4.1 SITE INFORMATION

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PART C: THE CONTRACT

Part C4: Site Information

PROJECT TITLE:	REQUESTS FOR BIDS FOR THE APPOINTMENT OF A CONTRACTOR FOR THE RENOVATION WORK TO THE GOLDFIELDS EDUCATION CENTRE FOR THE SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE AT THE KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, CAPE TOWN: COMPLETION PROJECT
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C4.1 Site Information

C4.1.1 Site Location

The site is located at the Kirstenbosch National Botanical Garden, Rhodes Drive, Newlands, Cape Town.

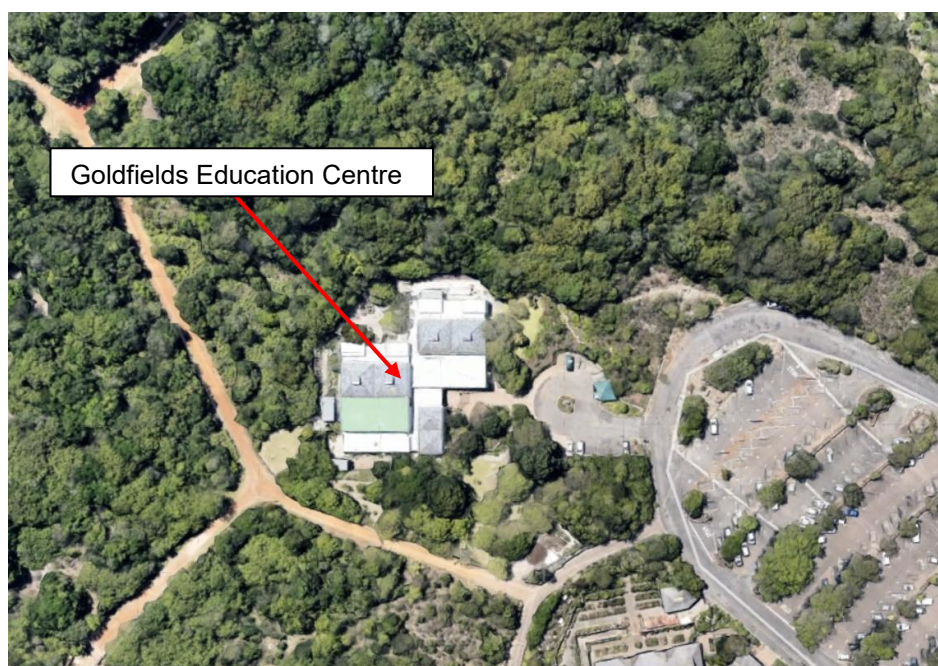


Figure 1: Location of Goldfields Education Centre

C4.1.2 Weather Information

The weather measurements to be recorded for each calendar month are:

- The cumulative rainfall (mm)
- The number of days with rainfall more than 10 mm

If any one of these weather measurements recorded within a calendar month, before the Completion Date for the whole of the works and at the place stated in this Contract Data is shown to be more than the amount sated below, then the contractor may notify the consultant of and inclement weather claim.

Month	Number of days with rain more than 10 mm
January	2
February	3
March	3
April	5
May	9
June	11
July	10
August	10
September	8
October	5
November	4
December	4

ANNEXURE A: 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

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 REPAIR 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 REPAIR WORK TO INSTALLATIONS, SYSTEMS AND EQUIPMENT

AA 09.01 GENERAL

During the repair and maintenance 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.

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 cowl;
- (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 dismantlable 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) 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) 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
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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 Plaston 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 (m³) 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
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 not 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 Plaston 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	MAINTENANCE FREQUENCY
1	Clean out and clear all rainwater gutters and full bores	Monthly
2	Clean out and clear all catch pits, channel drains and floor outlets	Monthly
3	Clean and unblock all drain pipes	Monthly
4	Check alignments of gutters	Six-monthly
5	Check and inspect all rainwater outlet gratings and replace if necessary	Six-monthly
6	Check gutter and pipe bracketing system and repair and replace if necessary	Four-monthly
7	Check and inspect manhole covers and frames for damages and replace if necessary	Six-monthly
8	Paint repairs to surface piping and equipment	Annually
9	Visually inspect and report on total system	Monthly

TABLE AA 10.02/2 - SOIL AND WASTEWATER DRAINAGE SYSTEM

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCE FREQUENCY
1	Visually inspect and report on complete installation	Monthly
2	Check, service and clean out grease traps	Monthly
3	Check, service and clean out oil separators	Monthly
4	Check, inspect and clean out all floor drains	Monthly
5	Check, inspect and clean out all gullies	Monthly
6	Replace broken or missing gully gratings	Four-monthly
7	Check, inspect, repair or replace all manhole covers and frames and builder's work to manholes	Four-monthly

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCE FREQUENCY
8	Check, inspect and repair manhole benching.	Four-monthly
9	Check, inspect, repair or replace all inspection eyes, end caps and cleaning eye covers	Four-monthly
10	Check, inspect, repair or replace all bracketing systems	Four-monthly
11	Check, inspect, report and unblock any blockage that occurs	Monthly
12	Check, inspect, repair/replace and clean out all equipment traps	Monthly
13	Paint repairs to surface piping and equipment	Annually
14	Rodding of all main sewer lines	At start of Contract
15	Check, inspect, service, repair/replace all vacuum and two-way vents	Four-monthly

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	Log all water meter readings	Monthly
3	Log all pressure gauge readings	Monthly
4	Check, inspect, report and repair leaks	Monthly
5	Replace all valve gaskets, gland packings and seals	Annually
6	Sample water supply and chemical analyses to be provided by approved company	Annually
7	Bulk Water storage tanks to be emptied, cleaned out, inspected, repaired and resealed where necessary	Annually
8	Check, inspect, service, repair and readjust all pressure-reducing valves	Six-monthly
9	Check, inspect and test operation of all valves on site	Monthly
10	Clean out all strainers	Monthly
11	Check, inspect, service test and repair/replace all safety and expansion release valves	Six-monthly
12	Check, inspect, repair or replace all bracketing systems	Six-monthly
13	Check, inspect, service, repair/replace all air release valves and vacuum breakers	Six-monthly
14	Check, service, repair or replace all ball float valves	Four-monthly
15	Check, inspect, test, service, repair/replace all geyser installations	Six-monthly
16	Check, inspect, test, service and repair/replace all non-return valves	Four-monthly
17	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	Visually inspect and report on complete installation	Monthly
2	Inspect, repair/replace WC seats and covers	Monthly
3	Replace all tap washers	Six-monthly
4	Replace all tap gland packings	Six-monthly

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCE FREQUENCY
5	Check, inspect, repair, fix and where necessary replace sanitary ware mountings and brackets	Four-monthly
6	Check, inspect, service, repair/replace all cistern flushing mechanisms	Monthly
7	Check, inspect, service, repair/replace all brassware	Four-monthly
8	Check, inspect, service, repair/replace all sanitary ware	Four-monthly
9	Check, inspect, service, repair, readjust all flushing valves	Four-monthly
10	Replace all flushing valve internal parts with replacement kits	Once per Contract
11	Stained equipment to be cleaned with approved manufacturer's cleaning agent	Six-monthly
12	Check, inspect, report and repair all leaks	Monthly
13	Check, inspect, repair/replace all shower gratings	Four-monthly
14	Paint repairs to all equipment	Annually
15	Check, inspect, repair, service, replace all missing valves	Six-monthly
16	Replace missing tap handles	As occur
17	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	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	Water storage tanks to be cleaned out resealed/repared if necessary	Annually
6	Check, inspect, service, repair/replace all non-return valves and backflow preventers	Four-monthly
7	Check, inspect, report and repair all leaks	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

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

PAA 01	SCOPE
PAA 02	GENERAL DESCRIPTION OF INSTALLATION
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PAA 01 SCOPE

- (a) This specification covers the particulars of the maintenance work to the plumbing and drainage installations at Voorberg Prison. 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
- SB: Operating and Maintenance Manuals
- SC: General Decommissioning, Testing and Commissioning Procedures
- SD: General Training

The intended maintenance work to this installation will restore the existing installation to a safe, efficiently functional system that complies with all statutory regulations and applicable standards, in the process repairing all defects and shortfalls. Monthly maintenance responsibilities for each installation shall commence with access to the site. The Contractor shall be responsible to take over the completed installation which shall be maintained and serviced by the Contractor for the duration of the 36-month Contract period. Additional repair work will also form part of the Maintenance work in the Contract.

The various sites consist of various facilities, as listed below, which form part of the maintenance and servicing contract for plumbing and drainage installation.

PAA 01.02 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.

PAA 01.01 GENERAL PLUMBING AND DRAINAGE INFORMATION

All the buildings are connected to water meters. Other items in buildings are described below:

PAA 01.01.02 PLUMBING AND DRAINAGE INFORMATION

<u>PLUMBING AND DRAINAGE INFORMATION</u>						
No.	DESCRIPTION	Taps Valves	WC Pan	WC Cistern	Urinal	Wash Hand Basin
		No.	No.	No.	No.	No.
97	<i>House Type A</i>	11	1	1	-	1
54	<i>House Type B</i>	11	1	1	-	2
10	<i>House Type C</i>	13	2	2	-	2
7	<i>House Type D</i>	11	1	1	-	2
16	<i>House Type E</i>	15	2	2	-	2
1	<i>Male Single Quarters</i>	91	7	7	9	30
1	<i>Female Single Quarters</i>	91	7	7	9	30

PAA 02 GENERAL DESCRIPTION OF INSTALLATIONS

The existing plumbing and drainage installations provide potable hot and cold water to the various buildings on these sites. The potable cold-water installation is provided with supply points from the underground reticulation networks outside the buildings to an above ground reticulation network via service ducts, ceiling voids and chased into walls to outlet points. The potable hot-water installation is provided with supplies from various domestic or industrial geysers where applicable.

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 SANITARY AND BRASSWARE: GENERAL

	SANITARY WARE	BRASSWARE	TRAP
WCs (cistern)	Armitage Shanks/Vaal: white, floor-mounted, vitreous china	Brass shut-off valves	Not applicable
Cistern (WC)	Wall-mounted, white, CI; Wall-mounted, white, vitreous china; Wall-mounted, white, plastic	Brass shut-off valves	Not applicable
Urinals (flush)	Armitage Shanks, white, wall-mounted, vitreous china;	Junior flush valve, exposed type, shut-off valves;	CP bottle trap. Flexi P-

	SANITARY WARE	BRASSWARE	TRAP
	Citimetal stainless steel wall-mounted.	Brass shut-off valves	trap; Flexi S-trap
WHBs	Armitage Shanks, white wall-mounted, white enamel; Wall-mounted stainless steel	Cobra 15 mm, CP star handle pillar taps	Flexi P-trap; Flexi S-trap
Showers		15 mm CP under-tile stop-cocks	
Wash troughs	Stainless steel, double bowl, wall-mounted	Cobra 15 mm, CP star handle wall type taps	Flexi P-trap
Baths	Steel enamel, white, 2 m long	Cobra 20 mm, CP star handle wall type taps	Not applicable
Sinks	Stainless steel, cabinet-mounted	20 mm CP star handle taps, 20 mm Cobra taps CP sink mixer with over arm swivel outlet	Flexi P-trap, lead P-trap
Wash tubs	Concrete double bowl	CP wall type taps	Lead P-trap

PAA 03.02 SANITARY DRAINAGE PIPING: GENERAL

	PIPE	FITTINGS	EQUIPMENT
Gullies	VCP	CI or plastic grating	Not applicable
Waste pipes	GMS, uPVC	Brass, uPVC	Not applicable
Soil pipes	S&S CI, uPVC	S&S CI, uPVC	Not applicable
Cleaning eyes	CI (ABC), uPVC	Not applicable	Not applicable
Vent pipes	S&S CI	S&S CI	Not applicable

PAA 03.03 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
Hot-water piping	Cu GMS	Conex, soldered GMS	Brass gate shut-off valve Brass gate shut-off valve

PAA 03.04 FIRE WATER PIPING: GENERAL

	PIPE	FITTINGS	EQUIPMENT
Fire water piping	GMS, Cu	GMS, Conex soldered	See specifications

PAA 03.06 FIRE WATER INSTALLATION QUANTITIES

The firefighting equipment currently installed is listed in Particular Specification PJC: Conventional Fire Fighting Equipment. The piped reticulation networks to these equipment items shall form part of this contract where applicable.

PAA 04 STATUS OF EXISTING INSTALLATION

The status of the equipment and installation at the time of compilation of this document is summarised below:

PAA 04.01 SANITARY AND BRASSWARE

The Scope of Works requires full Maintenance from the inception of the Contract on all facilities, buildings, installations, infrastructure and equipment regardless of any other repair related works that may occur during the Contract Period.

PAA 04.02 PLUMBING AND DRAINAGE INSTALLATION

The Scope of Works requires full Maintenance from the inception of the Contract on all facilities, buildings, installations, infrastructure and equipment regardless of any other repair related works that may occur during the Contract Period.

PAA 05 DETAILS OF REPAIR 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

The Contractor shall 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) Sanitary and brassware, including traps, brackets, piping, pan connectors, etc;
- (b) Sanitary drainage installation, including fittings, traps, floor drains, gullies, cleaning eyes, manholes, grease and oil separators, etc;
- (c) Domestic water piped installation, including fittings, valves, strainers, lagging and cladding, non-return valves, safety valves, etc;
- (d) Fire water piped installation, including fittings, valves, non-return valves, pressure gauges, etc;

- (e) Bracketing system;
- (f) Domestic geysers including valves, pressure reducing valves, strainers, vacuum breakers, safety valves, non-return valves, lagging and cladding, etc.
- (g) Industrial geysers including valves, pressure reducing valves, strainers, vacuum breakers, safety valves, non-return valves, lagging and cladding, etc.

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 sanitary ware including removal of stains, repair of chipped enamel, replacing of damaged and missing seats and lids, de-scaling and cleaning of cisterns and servicing of filling and flushing mechanisms, fixing of loose fixtures and brackets, cleaning of traps, etc;
- (g) Servicing, overhauling and cleaning of existing brassware, including dismantling, de-scaling, repair kits, replacing of washers, gland packing and gaskets, replacing of missing tap handles and flushing assemblies, etc;
- (h) 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;
- (i) Servicing and repair of existing fire water piped reticulation, including fittings, valves, pressure gauges, brackets, etc;
- (j) Servicing, cleaning and repair of domestic geysers, including de-scaling, testing for leaks, replacing of elements, safety valves and thermostats if required, etc;
- (k) Handing over of complete systems on completion of the repair work to the satisfaction of the Engineer, when the maintenance period shall commence;
- (l) The supply and compilation of operating and maintenance manuals;
- (m) The testing, adjusting and commissioning of all systems;
- (n) The introduction of a maintenance control plan, including logging, recording and control procedures.

PAA 05.02 PLUMBING AND DRAINAGE INSTALLATION

The 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 Various Sites

- (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 brassware, such as taps, stop-cocks and flushing mechanisms with repair kits, and replace items that are missing or beyond repair.
- (iv) Service and repair sanitary ware, including chip repair, de-staining and re-coating of baths, WC bowls and wash hand basins, dent removal and de-staining of wash troughs and kitchen sinks and replacement of damaged or missing parts such as WC seats and lids and cistern lids. Replace missing or irreparably damaged equipment. The following replacement items shall be installed where required:
 - (1) Ceramic and Plastic cisterns
 - (2) Steel enamel bathtubs
 - (3) Stainless steel wash troughs
 - (4) Ceramic wash hand basins
- (v) Service and repair domestic geysers, including de-scaling, testing for leaks, replacement of electrical heating elements if required, servicing or replacement of valves, or replace leaking and corroded geysers where necessary.

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: installation

The unit of measurement shall be the installation reported on.

The tendered rate for the installation 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

The unit of measurement shall be the metre of each type of piping in the installation supplied and installed, including all fixtures and fittings.

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 INSTALLATIONUnit: 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 domestic geysers, including shut-off valves, non-return valves, strainers, pressure-reducing valves, 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 WAREUnit: 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 DOMESTIC 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), 400kPa 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 ENGINEERUnit: 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.20 SUPPLY AND INSTALLATION OF SOLAR POWERED GEYSER INSTALLATION.....Unit: number

The unit of measurement shall be the number of each solar powered 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 solar powered geysers which shall include all solar storage tanks and solar collector panels, including shut-off valves, non-return valves, strainers, pressure-reducing valves, vacuum breakers, air release valves, safety valves, etc, as well as connection to existing piping, electrical, lagging & cladding supply.

PAA.21 SUPPLY AND INSTALLATION OF DOMESTIC HEAT PUMP INSTALLATIONUnit: number

The unit of measurement shall be the number of each heat pump installation supplied and installed, including all associated pipe work and fittings.

The tendered rates shall include full compensation for the supply and installation of a heat pump installation which shall include the heat pump, circulating pump set, shut-off valves, non-return valves, strainers, pressure-reducing valves, vacuum breakers, air release valves, safety valves, etc., as well as connection to existing piping and electrical connection.(storage tank measured separately)

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 repair 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.

Fatal breakdown shall be defined as any equipment, components and systems preventing the supply of water to fire hydrants and fire hoses due to a failure of this system at the particular point of incident.

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

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AB 01 SCOPE

AB 01.01 This specification comprises all aspects regarding the construction 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 Goldfields Education Centre contract document and shall be read in conjunction with Section 2.3.4, the Additional Specifications included in the Bid Document.

AB 02 STANDARD SPECIFICATIONS, REGULATIONS, CODES AND ADDITIONAL SPECIFICATIONS

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	Speed Drives	SANS 1239	SANS 61084
			SANS 1250			
			SANS 1279	SANS61800		
			SANS 1777			
			SANS 10114			

AB 02.03 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.

AB 02.04 MANUFACTURER'S SPECIFICATIONS AND INSTALLATION INSTRUCTIONS

AB 02.05 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 TEST AND INSPECTION FOLLOWING COMPLETION OF CONSTRUCTION WORK

AB 03.01 All systems are to be checked by the Contractor prior to commissioning. Copies of all checks for each installation shall be presented to the Engineer for approval before commissioning takes place.

AB 03.02 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 03.02.01 continuity of ring final circuit conductors

AB 03.02.02 continuity of protective conductors, including main and supplementary equipotential bonding

AB 03.02.03	earth electrode resistance
AB 03.02.04	insulation resistance
AB 03.02.05	polarity
AB 03.02.06	earth fault loop impedance
AB 03.02.07	operation of residual current devices
AB 03.02.08	phase voltage
AB 03.02.09	current per phase
AB 03.02.10	illumination levels in lux

AB 03.03 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 04 **QUALITY ASSURANCE SYSTEM**

AB 04.01 Following formal approval of his Quality Assurance system by Engineer, the Contractor shall implement the approved QA system.

AB 04.02 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 Engineer.

AB 05 **COMMISSIONING OF INSTALLATION**

AB 05.01 On completion of the repair work, the contractor shall check and put all systems into operation.

AB 05.02 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 05.03 All installations shall be energised for a minimum continuous period of 96 hours immediately prior to the Engineer's Practical Completion inspection to verify lamp stability and reliability of power reticulation

AB 06 **QUALITY SPECIFICATION FOR MATERIAL AND EQUIPMENT**

AB 06.01 **TESTS**

After completion of the works and before first delivery is taken, a full test will be carried out on the installation for a period of sufficient duration to determine the satisfactory working thereof. During this period the installations will be inspected and the Contractor shall make good, to the satisfaction of the Representative/Agent, any defects which may arise.

The Contractor shall provide all instruments and equipment required for testing and any water, power and fuel required for the commissioning and testing of the installations at completion.

AB 06.02 **NOTICES AND FEES**

The Contractor shall give all notices required by and pay all necessary fees, including any inspection fees, which may be due to the local Supply Authority.

On production of the official account, only the net amount of the fee charged by the Supply Authority for connection of the installation to the supply mains, will be refunded to the Contractor by the Engineer.

AB 06.03 SCHEDULE OF FITTINGS

In all instances where schedule of light, socket outlet and power points are attached to or included on the drawings, these schedules are to be regarded as forming part of the specification.

AB 06.04 QUALITY OF MATERIALS

Only materials of first class quality shall be used and all materials shall be subject to the approval of the Engineer.

Wherever applicable the material is to comply with the relevant South African Bureau of Standards, specifications, or to British Standard Specifications, where no SANS Specifications exist.

Materials wherever possible, must be of South African manufacture.

AB 06.05 CONDUIT AND ACCESSORIES

(a)

(b) The type of conduit and accessories required for the service, i.e. whether the conduit and accessories shall be of the screwed type, plain-end type or of the non-metallic type and whether metallic conduit shall be black enamelled or galvanised, is specified in Part 2 of this specification.

(c)

(d) Unless other methods of installation are specified for certain circuits, the installation shall be in conduit throughout. No open wiring in roof spaces or elsewhere will be permitted.

(e)

(f) The conduit and conduit accessories shall comply fully with the applicable SANS specifications as set out below and the conduit shall bear the mark of approval of the South African Bureau of Standards.

(g)

- Screwed metallic conduit and accessories: SANS 1065, parts 1 and 2
- Plain-end metallic conduit and accessories: SANS 1065, parts 1 and 2
- Non-metallic conduit and accessories: SANS 950.

(h)

(i) All conduit fittings except couplings, shall be of the inspection type. Where cast metal conduit accessories are used, these shall be of malleable iron. Zinc base fittings will not be allowed.

(j)

(k) Bushes used for metallic conduit shall be brass and shall be provided in addition to locknuts at all points where the conduit terminates at switchboards, switch-boxes, draw-boxes, etc.

(l)

(m) Draw-boxes are to be provided in accordance with the "Wiring Code" and wherever necessary to facilitate easy wiring.

(n)

(o) For light and socket outlet circuits, the conduit used shall have an external diameter of 20mm. In all other instances the sizes of conduit shall be in accordance with the "Wiring Code" for the

specified number and size of conductors, unless otherwise directed in part 2 of this specification or indicated on the drawings.

(p)

(q) Only one manufactured type of conduit and conduit accessories will be permitted throughout the installation.

(r)

(s) Running joints in screwed conduit are to be avoided as far as possible and all conduit systems shall be set or bent to the required angles. The use of normal bends must be kept to a minimum with exception of larger diameter conduits where the use of such bends is essential.

(t)

(u) All metallic conduit shall be manufactured of mild steel with a minimum thickness of 1,2mm for plain-end conduit and 1,6mm in respect of screwed conduit.

(v)

(w) Under no circumstances will conduit having a wall thickness of less than 1,6mm be allowed in screeding laid on top of concrete slabs.

(x)

(y) Bending and setting of conduit must be done with special bending apparatus manufactured for the purpose and which are obtainable from the manufacturers of the conduit systems. Damage to conduit resulting from the use of incorrect bending apparatus or methods applied must on indication by the Engineer's inspectorate staff, be completely removed and rectified and any wiring already drawn into such damaged conduits must be completely renewed at the Contractor's expense.

(z)

(aa) Conduit and conduit accessories used for flame-proof or explosion proof installations and for the suspension of luminaires as well as all load bearing conduit shall in all instances be of the metallic screwed type.

(bb)

(cc) All conduit and accessories used in areas within 50 km of the coast shall be galvanised to SANS 121 & 32.

(dd)

(ee) Tenderers must ensure that general approval of the proposed conduit system to be used is obtained from the local electricity supply authority prior to the submission of their tender. Under no circumstances will consideration be given by the Engineer to any claim submitted by the Contractor, which may result from a lack of knowledge in regard to the supply authority's requirements.

(ff)

AB 06.06

CONDUIT IN ROOF SPACES

Conduit in roof spaces shall be installed parallel or at right angles to the roof members and shall be secured at intervals not exceeding 1,5m by means of saddles screwed to the roof timbers.

Nail or crampets will not be allowed.

Where non-metallic conduit has been specified for a particular service, the conduit shall be supported and fixed with saddles with a maximum spacing of 450 mm. The Contractor shall supply and install all additional supporting timbers in the roof space as required.

Under flat roofs, in false ceilings or where there is less than 0,9m of clearance, or should the ceilings be insulated with glass wool or other insulating material, the conduit shall be installed in such a manner as to allow for all wiring to be executed from below the ceilings.

Conduit runs from distribution boards shall, where possible terminate in fabricated sheet steel draw-boxes installed directly above or in close proximity to the boards.

AB 06.07 SURFACE MOUNTED CONDUIT

Wherever possible, the conduit installation is to be concealed in the building work; however, where unavoidable or otherwise specified under Part 2 of the specification, conduit installed on the surface must be plumbed or levelled and only straight lengths shall be used.

The use of inspection bends is to be avoided and instead the conduit shall be set uniformly and inspection coupling used where necessary.

No threads will be permitted to show when the conduit installation is complete, except where running couplings have been employed.

Running couplings are only to be used where unavoidable, and shall be fitted with a sliced couplings as a lock nut.

Conduit is to be run on approved spaced saddles rigidly secured to the walls.

Alternatively, fittings, tees, boxes, couplings etc., are to be cut into the surface to allow the conduit to fit flush against the surface. Conduit is to be bedded into any wall irregularities to avoid gaps between the surface and the conduit.

Crossing of conduits is to be avoided, however, should it be necessary purpose-made metal boxes are to be provided at the junction. The finish of the boxes and positioning shall be in keeping with the general layout.

Where several conduits are installed side by side, they shall be evenly spaced and grouped under one purpose-made saddle.

Distribution boards, draw-boxes, industrial switches and socket outlets etc., shall be neatly recessed into the surface to avoid double sets.

In situations where there are no ceilings the conduits are to be run along the wall plates and the beams.

Painting of surface conduit shall match the colour of the adjacent wall finishes.

Only approved plugging materials such as aluminium inserts, fibre plugs, plastic plugs, etc., and round-head screws shall be used for fixing saddles, switches, socket outlets, etc., to walls, wood plugs and the plugging in joints in brick walls are not acceptable.

AB 06.08 CONDUIT IN CONCRETE SLABS

In order not to delay building operations the Contractor must ensure that all conduits and other electrical equipment which are to be cast in the concrete columns and slabs are installed in good time.

The Contractor shall have a representative in attendance at all times when the casting of concrete takes place.

Draw-boxes, expansion joint boxes and round conduit boxes are to be provided where necessary. Sharp bends of any nature will not be allowed in concrete slabs.

Draw and/or inspection boxes shall be grouped under one common cover plate, and must preferably be installed in passages or male toilets.

All boxes, etc., are to be securely fixed to the shuttering to prevent displacement when concrete is cast. The conduit shall be supported and secured at regular intervals and installed as close as possible to the neutral axis of concrete slabs and/or beams.

Before any concrete slabs are cast, all conduit droppers to switchboards shall be neatly spaced and rigidly fixed.

AB 06.09 FLEXIBLE CONNECTIONS FOR CONNECTING UP OF STOVES, MACHINES, ETC

Flexible tubing connections shall be of galvanised steel construction, and in damp situations of the plastic sheathed galvanised steel type. Other types may only be used subject to the prior approval of the Engineer's site electrical representative.

Connectors for coupling onto the flexible tubing shall be of the gland or screw-in types, manufactured of either brass or cadmium or zinc plated mild steel, and the connectors after having been fixed onto the tubing, shall be durable and mechanically sound.

Aluminium and zinc alloy connectors will not be acceptable.

AB 06.10 WIRING

Except where otherwise specified in Part 2 of this specification, wiring shall be carried out in conduit throughout. Only one circuit per conduit will be permitted.

No wiring shall be drawn into conduit until the conduit installation has been completed and all conduit ends provided with bushes. All conduits to be clear of moisture and debris before wiring is commenced.

Unless otherwise specified in Part 2 of this specification or indicated on the service drawings, the wiring of the installation shall be carried out in accordance with the "Wiring Code". Further to the requirements concerning the installation of earth conductors to certain light points as set out in the "Wiring Code", it is a specific requirement of this document that where plain-end metallic conduit or non-metallic conduit has been used, earth conductors must be provided and drawn

into the conduit with the main conductors to all points, including all luminaires and switches throughout the installation.

Wiring for lighting circuits is to be carried out with 1,5mm² conductors and a 1,5mm²-earth conductor. For socket outlet circuits the wiring shall comprise 4mm² conductors and a 2,5mm²-earth conductor. In certain instances, as will be directed in Part 2 of this specification, the sizes of the aforementioned conductors may be increased for specified circuits. Sizes of conductors to be drawn into conduit in all other instances, such as feeders to distribution boards, power points etc., shall be as specified elsewhere in this specification or indicated on the drawings. Sizes of conductors not specified must be determined in accordance with the "Wiring Code".

The loop-in system shall be followed throughout, and no joints of any description will be permitted.

The wiring shall be done in PVC insulated 600/1000 V grade cable to SANS 1574.

Where cable ends connect onto switches, luminaires etc., the end strands must be neatly and tightly twisted together and firmly secured. Cutting away of wire strands of any cable will not be allowed.

AB 06.11 SWITCHES AND SOCKET OUTLETS

All switches and switch-socket outlet combination units shall conform to the Quality Specifications, which form part of this specification.

No other than 16 A 3 pin sockets are to be used, unless other special purpose types are distinctly specified or shown on the drawings.

All light switches shall be installed at 1,4m above finished floor level and all socket outlets as directed in the Schedule of Fittings which forms part of this specification or alternatively the height of socket outlets may be indicated on the drawings.

AB 06.12 SWITCHGEAR

Switchgear, which includes circuit breakers, iron-clad switches, interlocked switch-socket outlet units, contactors, time switches, etc., is to be in accordance with the Quality Specifications which form part of this specification and shall be equal and similar in quality to such brands as may be specified.

For uniform appearance of switchboards, only one approved make of each of the different classes of switchgear mentioned in the Quality Specifications shall be used throughout the installations.

AB 06.13 SWITCHBOARDS

All boards shall be in accordance with the types as specified, be constructed according to the detail or type drawings and must be approved by the Engineer before installation.

In all instances where provision is to be made on boards for the supply authority's main switch and/or metering equipment the contractor must ensure that all requirements of the authorities concerned in this respect are met.

Any construction or standard type aboard proposed, as an alternative to that specified must have the prior approval of the Engineer.

All busbars, wiring, terminals, etc., are to be adequately insulated and all wiring is to enter the switchgear from the back of the board. The switchgear shall be mounted within the boards to give a flush front panel. Cable and boxes and other ancillary equipment must be provided where required.

Clearly engraved labels are to be mounted on or below every switch. The working of the labels in English, is to be according to the lay-out drawings or as directed by the Engineer's representative and must be confirmed on site. Flush mounted boards to be installed with the top of the board 2,0m above the finished floor level.

AB 06.14 WORKMANSHIP AND STAFF

Except in the case of electrical installations supplied by a single-phase electricity supply at the point of supply, an accredited person shall exercise general control over all electrical installation work being carried out.

The workmanship shall be of the highest grade and to the satisfaction of the Engineer.

All inferior work shall, on indication by the Engineer's inspecting officers, immediately be removed and rectified by and at the expense of the Contractor.

AB 06.15 CERTIFICATE OF COMPLIANCE

On completion of the service, a certificate of compliance must be issued to the Engineer's Representative/Agent in terms of the Occupational Health and Safety Act, 1993 (Act 85 of 1993).

AB 06.16 EARTHING OF INSTALLATION

Main earthing

The type of main earthing must be as required by the supply authority if other than the Engineers, and in any event as directed by the Engineer's representative, who may require additional earthing to meet test standards.

Where required an earth mat shall be provided, the minimum size, unless otherwise specified, being 1,0m x 1,0m and consisting of 50mm diameter hard-drawn bare copper wires at 250mm centres, brazed at all intersections.

Alternatively or additionally earth rods or trench earths may be required as specified or directed by the Engineer's authorised representative.

Installations shall be effectively earthed in accordance with the “Wiring Code” and to the requirements of the supply authority. All earth conductors shall be stranded copper with or without green PVC installation.

Connection from the main earth bar on the main board must be made to the cold water main, the incoming service earth conductor, if any and the earth mat or other local electrode by means of 12mm x 1,60 mm solid copper strapping or 16 mm² stranded (not solid) bare copper wire or such conductor as the Engineer’s representative may direct. Main earth copper strapping where installed below 3m from ground level, must be run in 20 mm diameter conduit securely fixed to the walls.

All other hot and cold water pipes shall be connected with 12mm x 0,8mm perforated for solid copper strapping (not conductors) to the nearest switchboard. The strapping shall be fixed to the pipework with brass nuts and bolts and against walls with brass screws at 150-mm centres. In all cases where metal water pipes, down pipes, flues, etc., are positioned within 1,6m of switchboards an earth connection consisting of copper strapping shall be installed between the pipework and the board. In vertical building ducts accommodating both metal water pipes and electrical cables, all the pipes shall be earthed at each distribution board.

Roofs, gutters and down pipes

Where service connections consist of overhead conductors, all metal parts of roofs, gutters and down pipes shall be earthed. One bare 10mm² copper conductor shall be installed over the full length of the ceiling void, fixed to the top purlin and connected to the main earth conductor and each switchboard. The roof and gutters shall be connected at 15m intervals to this conductor by means of 12mm X 0,8mm copper strapping (not conductors) and galvanised bolts and nuts. Self-tapping screws are not acceptable. Where service connections consist of underground supplies, the above requirements are not applicable.

Sub-distribution boards

A separate earth connection shall be supplied between the earth busbar in each sub-distribution board and the earth busbar in the Main Switchboard. These connections shall consist of a bare or insulated stranded copper conductors installed along the same routes as the supply cables or in the same conduit as the supply conductors. Alternatively armoured cables with earth continuity conductors included in the armouring may be utilised where specified or approved.

Sub-circuits

The earth conductors of fall sub-circuits shall be connected to the earth busbar in the supply board in accordance with SANS 10142.

Ring Mains

Common earth conductors may be used where various circuits are installed in the same wire way in accordance with SANS 10142. In such instances the sizes of earth conductors shall be equivalent to that of the largest current carrying conductor installed in the wire way, alternatively the size of the conductor shall be as directed by the Engineer. Earth conductors for individual

circuits branching from the ring main shall be connected to the common earth conductor with T-ferrules or soldered. The common earth shall not be broken.

Non-metallic Conduit

Where non-metallic conduit is specified or allowed, the installation shall comply with the Engineer's standard quality specification for "conduit and conduit accessories".

Standard copper earth conductors shall be installed in the conduits and fixed securely to all metal appliances and equipment, including metal switch boxes, socket-outlet boxes, draw-boxes, switchboards, luminaires, etc. The securing of earth conductors by means of self-threading screws will not be permitted.

Flexible Conduit

An earth conductor shall be installed in all non-metal flexible conduit. This earth conductor shall not be installed externally to the flexible conduit but within the conduit with the other conductors. The earth conductor shall be connected to the earth terminals at both ends of the circuit.

Connection

Under no circumstances shall any connection points, bolts, screws, etc., used for earthing be utilised for any other purpose. It will be the responsibility of the Contractor to supply and fit earth terminals or clamps on equipment and materials that must be earthed where these are not provided.

Unless earth conductors are connected to proper terminals, the end shall be tinned and lugged.

AB 06.17

MOUNTING AND POSITIONING OF LUMINAIRES

The Contractor is to note that in the case of board and acoustic tile ceilings, i.e. as opposed to concrete slabs, close co-operation with the building contractor is necessary to ensure that as far as possible the luminaires are symmetrically positioned with regard to the ceiling pattern.

The layout of the luminaires as indicated on the drawings must be adhered to as far as possible and must be confirmed with the Engineer's representative.

Fluorescent luminaires installed against concrete ceilings shall be screwed to the outlet boxes and in addition 2 x 6mm expansion or other approved type fixing bolts are to be provided. The bolts are to be $\frac{3}{4}$ of the length of the luminaires apart.

Fluorescent luminaires to be mounted on board ceilings shall be secured by means of two 40mm x No. 10 round head screws and washers. The luminaires shall also be bonded to the circuit conduit by means of locknuts and brass bushes. The fixing screws are to be placed $\frac{3}{4}$ of the length of the fitting apart.

Earth conductors must be drawn in with the circuit wiring and connected to the earthing terminal of all fluorescent luminaires as well as other luminaires exposed to the weather in accordance with the "Wiring Code".

Incandescent luminaires are to be screwed directly to outlet boxes in concrete slabs. Against board ceilings the luminaires shall be secured to the bracing or joists by means of two 40mm x No. 8 round head screws.

AB 07 **INSTALLATION TECHNICAL DETAILS**

AB 07.01 **CABLE SLEEVE PIPES**

Where cables cross under roadways, other services and where cables enter buildings, the cables shall be installed in asbestos-cement pipes, earthenware or high-density polyethylene pipes.

The ends of all sleeves shall be sealed with a non-hardening watertight compound after the installation of cables. All sleeves intended for future use shall likewise be sealed.

AB 07.02 **NOTICES**

The Contractor shall issue all notices and make the necessary arrangements with Supply Authorities, the Postmaster-General, S.A. Transport Services, Provincial or National Road Authorities and other authorities as may be required with respect to the installation.

AB 07.03 **ELECTRICAL EQUIPMENT**

All equipment and fittings supplied must be in accordance with the attached quality specification (Part 3 of this document), suitable for the relevant supply voltage, and frequency and must be approved by the Engineer's representative.

AB 07.04 **DRAWINGS**

The drawings generally show the scope and extent of the proposed work and shall not be held as showing every minute detail of the work to be executed.

The position of power points, switches and light points that may be influenced by built-in furniture must be established on site, prior to these items being built in.

AB 07.05 **BALANCING OF LOAD**

The Contractor is required to balance the load as equally as possible over the multiphase supply.

AB 07.06 **SERVICE CONDITIONS**

All plant shall be designed for the climatic conditions appertaining to the service.

AB 07.07 **SWITCHES AND SOCKET OUTLETS**

The installation of switches and socket outlets must conform to clause PAB.06.11 of this specification.

AB 07.08 LIGHT FITTINGS AND LAMPS

The installation and mounting of luminaires must conform with clause PAB 06.18 of this specification.

All fittings to be supplied by the Contractor shall have the approval of the Engineer. Incandescent lamps shall bear the approved mark of the S.A.B.S. and shall have the British light centre length.

The light fittings must be of the type specified in the Schedule of Light Fittings.

AB 07.09 EARTHING AND BONDING

The Contractor will be responsible for all earthing and bonding of the building and installation. The earthing and bonding is to be carried out strictly as described in clause PAB 09.16 of this specification and to the satisfaction of the Engineer's representative.

AB 07.10 MAINTENANCE OF ELECTRICAL SUPPLY

All interruptions of the electrical supply that may be necessary for the execution of the work, will be subject to prior arrangement between the Contractor and the user Engineer and the Engineer's representative.

AB 07.11 EXTENT OF WORK

The work covered by this contract comprises the complete electrical installation, in working order, as shown on the drawings and as per this specification, including the supply and installation of all fittings and also the installation of such equipment supplied by the Engineer.

AB 07.12 SUPPLY AND CONNECTION

The supply will be at 400/230 Volt 50Hz.

The Contractor will be responsible for the supply and installation of the supply cable from the PV installation to the Main distribution board and cabling between the Main Distribution Board and Sub Distribution Board. The size and length of the cable is listed in the Schedule of Cables and measured in the Bills of Quantities.

AB 07.13 CONDUIT AND WIRING

Conduit and conduit accessories shall be black enamelled/galvanised screwed conduit or black enamelled/galvanised plain end conduit in accordance with SANS 121 and 32 respectively.

All conduits, regardless of the system employed, shall be installed strictly as described in the applicable paragraphs of clauses 4 to 8 of Part 1 of the specification. Wiring of the installation shall be carried out as directed in clause 9 part 1 of this specification.

Where plain end conduit is offered all switches and light fittings must be supplied with a permanent earth terminal for the connection of the earth wire.

Lugs held by switch fixing screws or self tapping screws will not be acceptable.

Power Trunking

The Contractor shall be responsible for the supply and installation of all power trunking complete with corner pieces, end pieces, junction pieces, supply conduits, cover plates and power outlets as specified and indicated on the drawings.

The power trunking must comply with SANS 61084-1. The Contractor must ensure that the power trunking is installed to satisfaction of the Engineer's representative before commencing with the wiring of the power trunking.

AB 07.14 POWER POINTS

Allow for the installation of power points and equipment as listed in the schedule, indicated on the drawings and described below:

Water Heaters

The Contractor must electrically connect all water heaters as specified and listed in the Schedule of Power Points.

NOTE: The hot water installation must be approved by the Engineer's Representative/Agent. Detail with regard to the size and type of water heaters that must be provided must be obtained from the Architect.

AB 07.15 CABLES

The Contractor shall supply and completely install all distribution cables as indicated on the drawings, and listed in the Schedule of Cables.

The storage, transportation, handling and laying of the cables shall be according to first class practice, and the contractor shall have adequate and suitable equipment and labour to ensure that no damage is done to cables during such operations.

The cable-trenches shall be excavated to a depth of 1m deep below ground level and shall be 450mm wide for one to three cables, and the width shall be increased where more than three cables are laid together so that the cables may be placed at least two cable diameters apart throughout the run. The bottom of the trench shall be level and clean and the bottom and sites free from rocks or stones liable to cause damage to the cable.

The Contractor must take all necessary precautions to prevent the trenching work being in any way a hazard to the personnel and public and to safeguard all structures, roads, sewage works or other property on the site from any risk of subsidence and damage.

In the trenches the cables shall be laid on a 75mm thick bed of earth and be covered with a 150-mm layer of earth before the trench is filled in.

All joints in underground cables and terminations shall be made either by means of compound filled boxes according to the best established practice by competent cable jointers using first class materials or by means of approved epoxy-resin pressure type jointing kits such as "Scotchcast". Epoxy-resin joints must be made entirely in accordance with the manufacturer's instructions and with materials stipulated in such instructions. Low tension PVCA cables are to be made off with sealing glands and materials designed for this purpose which must be of an approved make. Where cables are cut and not immediately made off, the ends are to be sealed without delay.

The laying of cables shall not be commenced until the trenches have been inspected and approved. The cable shall be removed from the drum in such a way that no twisting, tension or mechanical damage is caused and must be adequately supported at intervals during the whole operation. Particular care must be exercised where it is necessary to draw cables through pipes and ducts to avoid abrasion, elongation or distortion of any kind. The ends of such pipes and ducts shall be sealed to approval after drawing in of the cables.

Backfilling (after bedding) of the trenches is to be carried out with a proper grading of the material to ensure settling without voids, and the material is to be tamped down after the addition of every 150mm. The surface is to be made good as required.

On each completed section of the laid and jointed cable, the insulation resistance shall be tested to approval with an approved "Megger" type instrument of not less than 500 V for low tension cables.

Earth continuity conductors are to be run with all underground cables constituting part of a low tension distribution system. Such continuity conductors are to be stranded bare copper of a cross-sectional area equal to at least half that of one live conductor of the cable, but shall not be less than 4mm² or more than 70mm². A single earth wire may be used as earth continuity conductor for two or more cables run together, branch earth wires being brazed on where required.

AB 07.16 LAYING, JOINTING AND MAKING OFF OF ELECTRICAL CABLES

[The requirements specified hereafter, are aimed essentially at high tension cable but are also valid for low tension cable, where applicable.]

The use of the term "Inspector", includes the engineer or inspector of the Engineer or an empowered person of the concerned supervising consulting engineer's firm.

No cable is to be laid before the cable trench is approved and the soil qualification of the excavation is agreed upon by the Contractor and inspector.

After the cable has been laid and before the cable trench is back-filled the inspector must ensure that the cable is properly bedded and that there is no undesirable material included in the bedding layer.

All cable jointing and the making off of the cables must only be carried out by qualified experienced cable jointers. Helpers of the jointers may not saw, strip, cut, solder, etc. The cable and other work undertaken by them must be carried out under the strict and constant supervision of the jointer.

Before the Contractor allows the jointer to commence with the jointing work or making off of the cable (making off is recognized as half a joint) he must take care and ensure:

that he has adequate and suitable material available to complete the joint properly and efficiently. Special attention must be given to ensure the cable ferrules and cable lugs are of tinned copper and of sufficient size. The length of the jointing lugs must be at least six times the diameter of the conductor,

that the joint pit is dry and that all loose stones and material are removed,

that the walls and banks of the joint pit are reasonable firm and free from loose material which can fall into the pit,

that the necessary coffer-dams or retaining walls are made to stop the flow of water into the joint pit,

that the joint pit is provided with suitable groundsheets so that the jointing work is carried out in clean conditions,

that the necessary tents or sails are installed over the joint pit to effectively avert unexpected rainfall and that sufficient light or lighting is provided,

that the necessary means are available to efficiently seal the jointing or cable end when an unexpected storm or cloudburst occurs, regardless of how far the work has progressed,

that the cables and other materials are dry, undamaged and in all respects are suitable for the joint work or making off,

that the heating of cable oil, cable compound, plumbers metal and solder is arranged that they are at the correct temperature when required so that the cable is not unnecessarily exposed to the atmosphere and consequently the ingress of moisture (care must be taken of overheating)

Flow temperatures of cable oil and compound must be determined with suitable thermometers. Cable oil and compound must not be heated to exceed the temperatures given on the containers and precaution must be taken to ensure that the tin is not overheated in one position. The whole mass must be evenly and proportionally heated.

(Temperatures of solder and plumbers metal may be tested with brown paper (testing time: 3 seconds). The paper must colour slightly - not black or burnt).

Before the paper-insulated cables are joined, they must be tested for the presence of moisture by the cable jointers test. This consists of the insertion of a piece of unhandled insulated impregnated paper tape in warm cable oil heated to a temperature of $130 \pm 5^{\circ}\text{C}$.

Froth on the surface of the oil is an indication that moisture is present in the impregnated insulation and the amount of the froth gives an indication of the moisture present.

If the cable contains moisture or is found to be otherwise unsuitable for jointing or making of the inspector is to be notified immediately and he will issue the necessary instruction to cope with the situation.

The joint or making off of paper insulated cables must not be commenced during rainy weather.

Once a joint is in progress the jointer must proceed with the joint until it is complete and before he leaves the site.

The jointer must ensure that the material and his tools are dry at all times, reasonably clean and absolutely free from soil.

Relating to the jointing of the cable the following requirements apply:

All jointing must be carried out in accordance with recognized and tried techniques and comply strictly with the instructions given by the supplier of the jointing kit.

The cables must be twisted by hand so that the cores can be joined according to the core numbers. If necessary the cable is to be exposed for a short distance to accomplish this. Under no circumstances may the cores in a joint be crossed so as to enable cores to be joined according to the core numbers. If it is not possible to twist the cables so that the preceding requirements can be met, then cores are to be joined in the normal way without any consideration of the core numbers.

Normally the cables will have profile conductors. The conductors shall be pinched with gas pliers to form a circular section, bound with binding wire so that they do not spread, and then tinned before jointing.

Jointing ferrules, the length of which are at least 6 times the diameter of the conductors, must be slid over the conductor ends to be joined and pinched tightly. Then they are soldered by means of the ladle process whilst being pinched further closed.

Use resin only as a flux. The slot opening in the ferrule must be completely filled, including all depressions.

Remove all superfluous metal with a cloth dipped in tallow. Work during the soldering process must be from top to bottom. Rub the ferrule smooth and clean with aluminium oxide tape after it has cooled down to ensure that there are not any sharp points or edges.

NB: The spaces between the conductor strands must be completely filled by soldering process and must be carried out quick enough to prevent the paper insulation from burning or drying out unnecessarily.

After the ferrules have been rubbed smooth and clean, they and the exposed cores must be treated with hot cable oil (110°C) to remove all dust and moisture. These parts are to be thoroughly basted with the oil.

The joiner must take care that his hands are dry and clean before the joint is insulated. Also the insulating tape which is to be used must first be immersed in warm cable oil (110°C) for a sufficient period to ensure that no moisture is present.

After the individual cores have been installed they must be well basted with hot cable oil and again after the applicable separator and/or belt insulation tape is applied before the lead joint sleeve is placed in position.

The lead joint sleeve must be thoroughly cleaned and prepared before it is placed on the cable and must be kept clean during the whole jointing process. Seal the filling apertures of the sleeve with tape until the sleeve is ready for compound filling.

The plumbing joints employed to solder the joint sleeve to the cable sheath, must be cooled off with tallow and the joint sleeve is to be filled with compound while it is still warm. Top up continuously until the joint is completely filled to compensate for the compound shrinkage.

The outer joint box must be clean and free from corrosion. After it has been placed in position it must be slightly heated before being filled with compound. Top up until completely full.

As far as cable end boxes are concerned the requirements as set out above are valid where applicable.

AB 07.17 DISTRIBUTION BOARDS

The Contractor shall supply and install the distribution boards as indicated on the drawings and listed in the distribution Board Schedule. All distribution boards shall comply with this specification, and be approved by the Engineer's representative.

The following types of distribution boards are required for the service:

- Surface Mounted Distribution Board situated in the store room for power supply to the Inverter and Building Sub-Distribution Board.
- Surface Mounted Sub-Distribution Board situated in the passage providing power to all the equipment, power points, socket outlets and lights.

AB 07.18 SCHEDULE OF POWER POINTS

a)

BOARD	POWER POINT	TYPE	SIZE OF CABLES, CONDUIT AND WIRING	LOAD WATTS
DB-1		150 litre	20mm dia. conduit with 2 x 4mm ² conductors and 2,5mm ² earth wire	3000
DB-1		Heat Pump	20mm dia. conduit with 2 x 4mm ² conductors and 2,5mm ² earth wire	2000

PAB 07.19 SCHEDULE OF CABLES, CONDUIT AND WIRING

Supply, install and connect the following cable, conduit and wiring:

FROM	TO	SIZE AND TYPE	LOAD (kW)
PV INSTALLATION	MAIN D.B	1 x 16mm ² 2-core PVCA cable and 6mm ² earth wire	
MAIN D.B	SUB D.B	1 x 16mm ² 4-core PVCA cable and 10mm ² earth wire	

PAB 07.21 SCHEDULE OF DISTRIBUTION BOARDS

The front panels of normal supply, standby power and no-break supply sections shall be painted in distinctive colours as follows:

Normal supply : Light Orange, colour B26 of SANS 1091.
 Standby power : Signal Red, colour A11 of SANS 1091.
 No-break supply : Dark Violet, colour F06 or Olive Green, Colour H05 of SANS 1091.

Indicated is the probable fault level rating (kA) of the busbars. Refer to the Summary of Switchgear and Circuits for the minimum fault level rating of specified equipment.

BOARD	TYPE	PANEL	FAULT LEVEL	LOAD kVA
Main D.B	Surface with lockable door	Normal power	6	
SUB D.B	Surface with lockable door	Essential power	6	

AB 08 INSTALLATION DETAILS AND MEASUREMENT AND PAYMENT

AB 08.01 INSTALLATION DESCRIPTION

Building electrical systems to the Goldfields Education Centre

AB 08.02 SCOPE OF WORK

- Supply and install new power supply cable from the new PV Installation to the new Main Distribution Board;
- Supply and install cabling between the Main Distribution Board and the Sub Distribution
- The existing light fixtures will be evaluated to ensure adherence to minimum design standards and electrical use good practice.
- Service existing distribution board, labelling and provide legend card. Replacement of old Fuchs type circuit breakers. Install additional circuit breakers for power circuits to the hand dryers and other fixed equipment.
- Provide Certificate of Compliance on the Electrical Installation
- Supply and install new separate power supplies to the hand dryers in the ablutions. Power supply will be complete with conduit and PVC wiring. Hand Dryers currently work from light switches and socket outlets.
- Replace the existing power supply on the outside of the building to the outside lights that is in PVC trucking with PVC conduit complete with draw boxes and round boxes.

- Install a light switch for the library as the light switch is located in the passage.
- Supply and install power skirting complete with socket outlets above the work tops in the classrooms.
- Replace the existing old light switches and rusted light switch covers. The lights switches will furthermore be serviced and labelled.
- Replacement of socket outlets with single euro sockets as per latest SANS 10142 regulations.
- All socket outlets, light switches and isolators will be labelled with PVC brother labels according to the circuit number in the D.B Board (C.B 10 DB A)
- Replacement of defective light fittings, lamps and control gear. Defective light fittings to be replaced with LED type lights to minimize maintenance and to save on energy consumption.
- Supply and install 600x600mm panel LED lights at the new suspended ceilings in the classrooms.
- Supply and install power supply complete with 6A USO sockets for new LED panel lights that will be installed in the classrooms.
- Check and repair earthing and bonding of the building and at all the ablutions, geysers, heat pumps and equipment.
- Install LED strip lights underneath the cupboards to provide lightning at the worktops in the classrooms.
- Replacement of the outside lights with LED lights that with directional reflectors to minimize light pollution.
- Add additional outside lights on certain places around the building for security purposes.

AB 08.03 CABLE INSTALLATION

- AB 08.03.01** All low voltage 400V cables shall have stranded copper conductors, shall be of the 600/1 000V PVC/SWA/PVC type.
- AB 08.03.02** Where sleeves are not specified, cables shall be laid directly in the ground. Minimum laying depths shall be 1000 mm below final ground level unless otherwise specified. Contractor shall use hand excavation to minimise risk of damage to the existing services.
- AB 08.03.03** All trenching, including excavations, bedding layers, shoring and prevention of waterlogging, drainage of excavations, backfilling and compaction of trenches form part of this contract. The contractor shall be deemed to have allowed for the laying of cables, terminal boxes, glands and termination of cables. Trenches shall be compacted to a minimum of 93% of modified AASHTO density during backfilling.
- AB 08.03.04** Tenderers shall take cognisance of the fact that other services might be installed along the same routes as the cables. The contractor shall, before commencing with any excavations, peg out the proposed cable route and confirm it with the Resident Engineer.
- AB 08.03.05** Tenderers are to note that the minimum earth cable size buried in soil shall be 6 mm².

AB 08.03.06 Tenderers are to note that some cables will be installed underneath paved areas. The contractor shall be required to provide appropriate machinery for this type of installation and shall allow in his tender price for hiring of such machinery and the remedial civil work associated with this installation.

AB 08.03.07 Cables running on surfaces of walls shall be routed inside galvanised steel piping.

AB 08.04 **DISTRIBUTION BOARDS**

AB 08.04.01 **Existing Distribution Boards**

- (a) Tenderers shall note that, all distribution boards shall remain safe at all times. Adequate provision for the installation of temporary 3mm Perspex faceplates shall be allowed in the tender rates.

AB 08.04.02 **New Distribution Boards**

- (a) The distribution board requirements are as shown on the schematic drawings. Note the 6kA minimum fault level.
- (b) Electrical Contractors are advised to order the distribution board and equipment from a reputable manufacturer, as inferior boards will not be accepted.
- (c) It shall further be noted that late approval of drawings and distribution boards due to non-compliance with the specification will not relieve the Electrical Contractor from his obligations to complete the installation according to programme. No claims for delays or extension of time in this regard, will be entertained.
- (d) All phase, neutral and earth busbars shall be adequately sized to accept all present as well as future circuits and connections.
- (e) Door hinges shall be of the Perano manufacture. The steel door shall be padlockable.
- (f) The distribution board shall be powder coated
- (g) The front face panel shall be secured by means of the Perano type catches. Catches with slots or square key formats will not be acceptable.

AB 08.05 **CONDUIT**

AB 08.05.01 Conduit work under open roof structures, along service passages and inside plant rooms shall be done on the surface in a rectangular grid pattern. Galvanized steel hospital saddles shall be used on all exposed conduit. Caddy clamps shall be used on roof purlins. Maximum spacing of saddles and clamps shall be 750 mm.

AB 08.05.02 External draw box covers shall be sealed with white silicone after the installation has been completed.

AB 08.05.03 Chasing where applicable, shall only be done with a 230mm angle grinder fitted with a double diamond blade attachment.

AB 08.06 **OUTLETS**

AB 08.06.01 **General**

For the power installation, the Contractor shall be responsible for: -

- (a) Supply and installation of isolators for equipment, motors including wiring, earthing and bonding.
- (b) Final connection between isolator and equipment/motor.
- (c) Supply and installation of 16A switch socket outlets.
- (d) Wiring of all circuits back to the DB with SANS approved wire as specified in the schedule of quantities.
- (e) Labelling of all outlets as specified.
- (f) Testing and commissioning of all circuits.

AB 08.06.02 Isolators

- (a) Isolators shall be similar or approved equal to GEWISS GW70432 or Lumex Clipsal type WHD.
- (b) The isolators shall be the water resistant, surface mounted type installed in a non-corrosive enclosure
- (c) The enclosure shall bear a permanently fixed (screwed) engraved Traffolite label indicating the DB and circuit number.

AB 08.07 WIRING

AB 08.07.01 Surfix or Norse cable shall not be accepted on this project.

AB 08.07.02 All circuits shall be wired from fresh unused coils of red, white, blue and black conductors. The colours of conductors shall correspond to the phase from which that circuit is fed. The use of insulation tape to indicate phases will not be accepted.

AB 08.07.03 Wiring shall not be drawn into conduit until the conduit installation has been completed, fitted with bushes and all moisture and debris have been removed.

AB 08.07.04 Joints of any kind will not be permitted in wiring. No more than 2 single or 1 three phase circuit may be drawn into any 20mmØ conduit.

AB 08.08 EARTHING AND BONDING

AB 08.08.01 The electrical contractor is to ensure that the installations covered in this document are effectively earthed and bonded in accordance with the requirements of the SANS 0313.

AB 08.08.02 Particular attention shall be paid to geyser bonding and earthing.

AB 08.08.03 The earth conductor linking adjacent or back-to-back socket outlets shall not be cut. The conductor must be kept continuous and be doubled at the intermediate earth terminals.

AB 08.09 LABELLING OF CIRCUITS

AB 08.09.01 All conductors shall be marked by suitable cable markers indicating the circuit (e.g. P1 or G1 on both line and neutral conductors).

AB 08.09.02 The label shall indicate the supply DB and circuit number (e.g. DB-M-P5).

AB 08.10 INSPECTIONS

AB 08.10.01 The Electrical Engineer's or Client's representative will inspect the installation at any time. All inferior, unsuitable, unacceptable or rejected work shall, if indicated by the inspecting officers or the Engineer, be removed and shall be rectified by the electrical contractor at his own expense. Under no circumstances will these inspections relieve the electrical contractor of his obligations in terms of the document nor will these inspections be regarded as final approval of the works or portions thereof.

AB 08.10.02 Where inspections are requested by the Contractor, the Electrical Engineer's or Client's inspection shall only be carried out after the Contractor has carried out his own preliminary inspection to ensure that the Works are completed and comply with the documents. The Electrical Engineer's or Client's inspection shall therefore not be regarded as supervision, fault listing, quality assurance or site management.

AB 08.10.03 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 08.10.04 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
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A	2X 58W SABS OPEN CHANNEL FLUORESCENT LUMINAIRE - LASCON TYPE : R1-258 SS OR SIMILAR APPROVED
B	2X 36W SABS OPEN CHANNEL FLUORESCENT LUMINAIRE - LASCON TYPE : R1-236 SS OR SIMILAR APPROVED
C	46W IP65 SABS LED LUMINAIRE - BEKA TYPE : VLNLED 46N WITH WATERTIGHT DIFFUSER OR SIMILAR APPROVED
D	600X600 LED BACKLIT PANEL RECESSED MOUNTED COMPLETE WITH FLICKER FREE DRIVER 400K 36W LED'S ACRYLIC (OPAL) DIFFUSER, 3M CORD SET AND 5A PLUG TOP TYPE BEKA OR GENESIS ONE LED PANEL 600X600 30W/36W OR SIMILAR APPROVED
E	600X600 EMERGENCY LED BACKLIT PANEL RECESSED MOUNTED COMPLETE WITH FLICKER FREE DRIVER 400K 36W LED'S ACRYLIC (OPAL) DIFFUSER, 3M CORD SET AND 5A PLUG TOP TYPE BEKA OR GENESIS ONE LED PANEL 600X600 30W/36W OR SIMILAR APPROVED
F	600X600 LED BACKLIT PANEL SURFACE MOUNTED COMPLETE WITH FLICKER FREE DRIVER 400K 36W LED'S ACRYLIC (OPAL) DIFFUSER, 3M CORD SET AND 5A PLUG TOP TYPE BEKA OR GENESIS ONE LED PANEL 600X600 30W/36W OR SIMILAR APPROVED
G	600X600 EMERGENCY LED BACKLIT PANEL SURFACE MOUNTED COMPLETE WITH FLICKER FREE DRIVER 400K 36W LED'S ACRYLIC (OPAL) DIFFUSER, 3M CORD SET AND 5A PLUG TOP TYPE BEKA OR GENESIS ONE LED PANEL 600X600 30W/36W OR SIMILAR APPROVED
H	1200X600 LED PANEL RECESSED MOUNTED COMPLETE WITH 400K 48W LED'S ACRYLIC (OPAL) DIFFUSER, 3M CORD SET AND 5A PLUG TOP TYPE BEKA LED PANEL 1200X600 48W OR SIMILAR APPROVED
I	13W LED BULKHEAD LUMINAIRE - BEKA TYPE SERIES 30 OR SIMILAR APPROVED
J	220V LED STRIP LIGHTS CLEAR WHITE
K	LED PICTURE WALL LIGHTS
L	18W DECORATIVE HIGH PERFORMANCE OUTDOOR IP65 LED BULKHEAD SIMILAR OR EQUAL TO BEKA Q-VAL
M	17W LED DOWN LIGHT RECESSED MOUNTED COMPLETE WITH 3M CORD SET AND 5A PLUG TOP BEKA RONDO TYPE OR SIMILAR APPROVED
N	9W LED DOWN LIGHT SURFACE MOUNTED BEKA RONDO TYPE OR SIMILAR APPROVED

AB 08.10.05 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 08.10.06 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 50 mm² aluminium roof conductor in galvanised conduit from the roof cladding against the building to the earth electrode.

AB 08.11 MEASUREMENT AND PAYMENT

AB 08.11.01 Distribution boards and cabling

AB.01.01 Service distribution board.....Unit: number

The unit of measurement shall be the number of distribution kiosks or boards opened and serviced.

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.

AB.01.02 Supply and install distribution board..... Unit: number

The unit of measurement shall be the number of distribution boards supplied and installed .

The tendered rate shall include full compensation for the supply and installation of an epoxy painted new enclosure, mounting frames, plates, equipment, meters, labelling etc.

The tendered sum shall further include for wiring of the board, cable termination, cable labelling, remedial builders work and earth testing.

AB.01.03 Supply and install cablingUnit: m

The unit of measurement shall be the linear length of cable supplied and installed.

The tendered rate shall include full compensation for the 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.

AB.01.04 Supply and install wiringUnit: m

The unit of measurement shall be the linear length of conductors supplied and installed.

The tendered rate shall include full compensation for 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.

AB.01.05 Jointing and termination of cablesUnit: number

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 drawing

AB.01.06 Supply and install padlocksUnit: number

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.

AB.01.07 Excavate in all materials for trenches, backfill, compact and dispose of surplus materialUnit: m³

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.

AB.01.08 Supply and install cable sleevesUnit: 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.

AB.01.09 Supply and install plastic warning tape.....Unit: 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.

AB.01.10 Termination of the low voltage cable.....Unit: number

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.

AB.01.11 Supply and install earth continuity conductor.....Unit: 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.

AB.01.12 Termination and connect earth continuity conductor.....Unit: number

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.

AB.01.13 Supply and installation of circuit breakers.....Unit: number

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.

AB.01.14 Supply and installation of isolators.....Unit: number

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.

AB.01.15 Supply and install contactors.....Unit: number

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.

AB.01.16 Supply and install switching timers.....Unit: number

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.

AB.01.17 Supply and install earth leakage units.....Unit: number

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.

AB.01.18 Supply and install fuses.....Unit: number

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.

AB.01.19 Supply and install surge arrestors.....Unit: number

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.

AB.01.20 Supply wire marker kit.....Unit: number

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.

AB.08.11.02 LIGHTING SYSTEM

AB.02.01 Re-lamp luminaire Unit: number

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.

AB.02.02 Service luminaire Unit: number

The unit of measurement shall be the number of luminaires opened and serviced.

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

AB.02.03 Supply and install luminaire Unit: number

The unit of measurement shall be the number of luminaries supplied and installed .

The tendered rate shall include full compensation for the supply and installation of the specified type of light fitting complete with lamp and control gear, according to manufacturer's instructions.

AB.02.04 Supply and install light switch Unit: number

The unit of measurement shall be the number of light switches supplied and installed.

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.

AB.02.05 Supply and install photo-electric switch Unit: number

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.

AB.02.06 Replace luminaire diffuser Unit: number

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.

AB.02.07 Service light switch Unit: number

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.

AB.02.08 Remove, clean, store and reinstallation of luminaire Unit: number

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.

AB.02.09 Replace Lamp Holder Unit: number

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.

AB.02.10 Replace Luminaire internal components Unit: number

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.08.11.03 SMALL POWER AND FIXED APPLIANCES

AB.03.01 Supply and install socket outletUnit: number

The unit of measurement shall be the number of socket outlets supplied and installed.

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.

AB.03.02 Supply and install isolatorUnit: number

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 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.

AB.03.03 Replace plug topsUnit: number

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.

AB.03.04 Supply and install conduitUnit: 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.

AB.03.05 Supply and install wiring channelUnit: 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.

AB.03.06 Supply and install connections to fixed appliancesUnit: number

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.

AB.03.07 Service socket outlet Unit: number

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.

AB.03.08 Service isolator Unit: number

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.

AB.03.09 Replace power skirting Unit: 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.

AB.03.10 Supply and install Pratley boxes Unit: number

The unit of measurement shall be the number of Pratley boxes supplied and installed.

The tendered rate shall include full compensation for the supply and installation of the specified type of Pratley box.

AB.03.11 Supply and install draw boxes Unit: number

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.

AB.03.12 Supply and install draw box cover plates.....Unit: number

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.

AB.03.13 Replace “stop-start” local control panel.....Unit: number

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.

AB.03.14 Test and service ceiling mounted fan.....Unit: number

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.

AB.03.15 Replace ceiling mounted fan.....Unit: number

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.

AB.03.16 Service ceiling mounted fan control switch.....Unit: number

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.

AB.03.17 Replace ceiling mounted fan control switch.....Unit: number

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.

AB.03.18 Replace domestic stove components.....Unit: number

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.

AB.03.19 Replace geyser componentsUnit: number

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.

AB.03.20 Supply and Install StoveUnit: number

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.

AB.03.21 Provide Certificate of ComplianceUnit: 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.08.11.04 EARTHING AND BONDING

AB.04.01 Supply and install earthing and bonding for the installationUnit: Lump 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.

AB.04.02 Testing of the earth installation by a specialist contractorUnit: Lump sum

The tendered lump sum shall include full compensation for the testing of the earth installation by a specialist contractor approved by the Engineer.

AB.04.03 Supply and install earth electrodesUnit: number

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.

AB.04.04 Provide cadweld joint Unit: number

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.

AB.04.05 Earth building roof structure Unit: number

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.08.11.05 INSPECTION OF ELECTRICAL INSTALLATION

AB.05.01 Inspection of building general electrical installation Unit: 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 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 buildings.

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 02.01 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:

PW 371-	Specification of Materials and Methods to be used,
	fourth edition, Oct 1993
SANS 1200HB -	Cladding and Sheeting
SANS 1783-4 -	Softwood bracing and battens
SANS 935 -	Hot-dip (galvanised) zinc coatings
SANS 1273 -	Fasteners for sheet roof and wall coverings

BA 02.02 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.

BA 02.2 ADDITIONAL SPECIFICATIONS

Technical Specification BB: Carpentry and Joinery for Roofs and Ceilings
Technical Specification BC: Waterproofing of Concrete Roofs

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 occupied buildings. The new roof sheeting shall be 0,6 mm thick galvanised baked silicone polyester enamel paint (baked enamel) IBR or equivalent approved for roof slopes exceeding 15°. Concealed fixed type Galvanised baked enamel roof sheeting will in general be used to cover roofs with slopes not exceeding 15°. 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 (baked enamel), 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 baked enamel 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 PW 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/baked enamel 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/baked enamel 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 baked enamel/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

EPDM/silicone pipe-through-roof flashings to diameter 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 EPDM/silicone pipe through roof flashing and 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 PW 371.

Specification for non-visible roof insulation material:

Heavy grammage double sided 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 thermal insulation low density polyethylene bubble and Aluminium foil backing fire retardant grade 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 baked enamel) IBR or equivalent approved. The cladding must be laid in long lengths without end overlaps. Metal closers 0,8 mm thick galvanised (or baked enamel), 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 baked enamel 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/Galvanised baked enamel 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/Galvanised baked enamel 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 RAINWATER GOODS

BA 02.5.1 Gutters

Standard size for houses:

100 x 75 x 0,8 thick standard baked enamel/galvanised non-supporting beaded gutter. Galvanised brackets to be provided at every truss. Brackets to be painted to specification in the Schedule of Quantities.

Alternatively standard 140 x 127 x 83 x 0,6 mm thick concealed fix profile sheeting baked enamel/galvanised fascia gutter with galvanised gutter clips can be used.

Typical size for other buildings:

125 x 100 x 0,8 thick standard baked enamel self-supporting beaded gutter.

Dark colours to Consultant's specification.

The following paragraphs in specification PW 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 02.5.2 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 02.5.3 Gutter accessories and ancillary items

End stops: 0,8 mm thick baked enamel/galvanised finished end stops joined to gutter on site and sealed as for joints in gutters.

Outlets: 0,8 mm thick baked enamel/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 02.5.4 Down pipes

Standard sizes:

100 x 75 x 0,6 thick baked enamel/galvanised down pipes

100 x 100 x 0,8 thick baked enamel/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 02.5.5 **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 baked enamel/galvanised material, cut and mitred to suit. All joints to be sealed with an approved silicone sealant.

BA.02.5.6 **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 Galvanised baked enamel 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 Galvanised baked enamel broad flute metal closers. Bend up trough to form a dam.
0,6 mm thick Galvanised baked enamel Eaves Closer	Fix standard serrated narrow flute eaves closer to timber purlin. Patch plaster and touch up paint work.
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

Flashings: Refer to Technical Specifications BA	
	0,6 mm thick galvanised broad flute metal closers. Bend up trough to form a dam.
0,8 mm thick Galvanised baked enamel 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 Galvanised baked enamel broad flute metal closer. Bend up trough to form a dam. 154 mm girth (114 + 25 + 15 lip @ 15°) Galvanised baked enamel 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 Galvanised baked enamel 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 Galvanised baked enamel broad flute metal closers on rake. Bend up trough to form a dam.
0,8 mm thick Galvanised baked enamel 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 baked enamel broad flute metal closer. Bend up trough to form a dam.
0,8 mm thick Galvanised baked enamel 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 baked enamel 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 baked enamel 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 baked enamel 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 baked enamel broad flute metal closer on side wall cladding. Provide one row of continuous silicone on rib.
0,8 mm thick Galvanised baked enamel 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 @ 15°) Galvanised baked enamel 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.

Flashings: Refer to Technical Specifications BA	
	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 Galvanised baked enamel broad flute metal closer bedded in a row of silicone. Bend up trough to form a dam.
0,8 mm thick Galvanised baked enamel 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 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 @ 15°) 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 Galvanised baked enamel 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 baked enamel 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 @ 15°) Galvanised baked enamel 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 baked enamel Corner	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

Flashings: Refer to Technical Specifications BA	
Piece Flashing (for monitors)	2 rows of silicone. Provide broad flute polyclosers bedded in silicone in troughs.
Walls: (m)	
0,8 mm thick Galvanised baked enamel 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 baked enamel 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 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 Galvanised baked enamel 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 baked enamel broad flute metal closer for sill flashing.
0,8 mm thick Galvanised baked enamel 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 baked enamel broad flute metal closer for sill flashing.
0,8 mm thick Galvanised baked enamel 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 baked enamel 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)	

Flashings: Refer to Technical Specifications BA	
100 x 75 x 0,8 mm thick Galvanised baked enamel 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 Galvanised baked enamel down pipes; 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 Galvanised baked enamel 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 Galvanised baked enamel 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 Galvanised baked enamel 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.)	
EPDM/silicone pipe-through-roof flashings to diameter 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 EPDM/silicone pipe-through-roof flashings to diameter no. 2 for pipe diameters 40 - 80 mm and EPDM/silicone pipe-through-roof flashings to diameter no. 4 for pipe diameters 80 - 150 mm. EPDM/silicone pipe-through-roof flashings to diameter flashings are made of E.P.D.M. rubber compound of a carbon black colour.
0,8 mm thick Galvanised baked enamel 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	<p><u>Re-routing of roof void geyser pipework:</u> Disconnect and remove existing overflow pipe 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.</p> <p><u>Ventilation pipework:</u> 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 manufacturers specifications. Standard primer, one coat undercoat and two coats of super acrylic paint to exposed pipework to match existing paint system and colour.</p>
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BA.03.01 **DETAILS OF ROOF PAINT REPAIR WORK**

Specification of paint shall be an extremely durable weather and UV resistant coating system for Galvanised iron roofs or previously painted galvanised iron roofs.

A two coat system shall be used consisting of a two component recoatable polyurethane acrylic finish.

The mixing ratio of the dual pack enamel system shall be as per the manufacturer's specifications. Both components shall be stirred with a power mixer until homogeneous. The dual pack enamel system shall always be applied over a suitable primer and/or intermediate coats within the manufacture's specified over-coating intervals.

Contractor must ensure that the work is done by a competent person and must be approved by the Engineer before work may commence

SURFACE PREPARATION – PREVIOUSLY PAINTED

Remove all peeling paint by sanding, scraping or water cooled grinders fitted with reversible knotted wire brush. 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 to ensure soluble chloride content <75mg per m². Ensure that all degreaser is properly washed off.

SURFACE PREPARATION - UNPAINTED GALVANISED

Wash roof with degreaser, scotch brite pads and rinse thoroughly with clean water. Ensure that all degreaser is properly washed off, to ensure soluble chlorine content <75mg per m².

APPLICATION

Apply one coat of a two component anti-corrosive strontium chromate epoxy primer by using airless spray. Allow 4 hours drying time. Apply a second coat if necessary to achieve the specified DFT of 25 – 35 microns.

Apply one coat of a dual pack polyurethane enamel system with acrylic finish 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 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. He must issue a certificate of acceptance and compliance on completion to the client.

BA 03.2 SCHEDULED ITEMS

BA.01 Supply and install cladding and sheeting:.....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 roof sheeting and side cladding, subdivided for each type of sheeting, cladding and finish, each profile and straight or curved sheets.

The rate shall cover the cost of supplying, delivering, storing on Site, handling, moving, installing and fixing the sheeting or cladding (finished or prepainted as scheduled) complete with all necessary fasteners (all sheeting, cladding 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 sheeting:.....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, 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 sheeting: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 sheeting: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, etc..

The rate shall cover the cost of preparing, re-erecting, handling, moving, installing existing stockpiled sheeting 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 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 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.02.5 (all complete and subject to a three year written guarantee on watertightness 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.09 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 Galvanised baked enamel 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.10 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.11 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 roof sheeting 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 posidriv screws 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.12 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 posidriv 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.13 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.14 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.15 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 primer coat and one coat dual pack poly-urethane enamel system with acrylic finish roof paint, supplying, delivery and applying new primer and finishing coat, etc., without distinguishing between roof sheeting, side cladding, profile, finish, etc., as specified in BA 03.02

The rate shall also cover the cost of waste, all necessary scaffolding, etc.

BA.16 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.17 Pressure Clean existing roof tiles: **Unit: m²**

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

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BB 01 SCOPE

Carpentry and joinery shall mean the 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 corrective maintenance repairs 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:

PW 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

BB 02.03 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.

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 waness 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 PW 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 45° 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 PW 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 PW 371.

(a) Branderling to ceilings

Branderling to ceilings shall be replaced where:

- (i) Ceiling boards are replaced;
- (ii) Branderling is broken, rotten and beyond any further use.

New brandering shall be provided in accordance with clause 9.4 of PW 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. Branderling 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 branderling. Ceiling boards shall be in long lengths, symmetrically arranged with smaller panels as required and closely butted.

Replacement of new ceiling boards onto existing branderling 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 branderling 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 REPAIR 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.

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.

NEW WORK

(a) <u>Plates (sizes indicated)</u>	Unit: m
(b) <u>Beams (sizes indicated)</u>	Unit: m
(c) <u>Joists (sizes indicated)</u>	Unit: m
(d) <u>Rafters (sizes indicated)</u>	Unit: m
(e) <u>Purlins (sizes indicated)</u>	Unit: m
(f) <u>Roof trusses complete (drawing number indicated)</u>	Unit: number
(g) Etc	

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.

(a) Ceiling boards, trapdoors, cornices, cover strips, etc
(type and/or thickness indicated):

(i) Thickness, shape and description of applications Unit: m², m, number

(ii) Etc for other thicknesses, shapes, etc

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.

(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: m²
- (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: m³, m², 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
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BC 03	VARIATIONS AND ADDITIONS TO STANDARD SPECIFICATIONS
BC 04	DETAIL OF REPAIR WORK
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BC 06	MEASUREMENT AND PAYMENT

BC 01 SCOPE

This specification covers the corrective maintenance repairs 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 downpipes 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:

PW 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

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 PW 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 up stand 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/m³ : 10 %
 - (ii) Applications with a density exceeding 500 kg/m³ : 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 watertightness 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 locationUnit: m²

- (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 specifiedUnit: m²

- (b) Prepare existing concrete or screeded surface to receive new waterproofing systemUnit: m²

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: m²

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 : m²

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

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BD 01	SCOPE
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BD 04	DETAIL OF REPAIR WORK
BD 05	MAINTENANCE
BD 06	MEASUREMENT AND PAYMENT

BD 01 SCOPE

This specification covers the corrective maintenance repairs 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.

PW 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

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 trowel 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 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 ie 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 store room 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 $\pm 30\%$ 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 galvanized baked enamel 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 low density, non-cross-linked, closed cell, expanded poly-ethylene foam 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 at workshops

- (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 ratchet 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.

Specific specification : Repairs and replacements to agricultural kraals

Replace diamond mesh fence:

Existing diamond mesh shall, where indicated by the Engineer, be removed and replaced with new diamond mesh fence. The new galvanized diamond mesh shall be stretched and properly tied to the fencing wire. The diamond mesh or wire netting shall be secured by means of soft binding wire at 1,2 m centres along the top and bottom straining wires and at 3 m centres along each of the other fencing wires unless otherwise specified.

Diamond mesh

- (a) Diamond mesh (chain-link) fencing shall comply with the requirements of SANS 1373. The edge-finish shall be both sides clinched or barbed.
- (b) The nominal diameter of the wire shall be 2,5 mm and the mesh size shall be 40 mm x 40 mm.
- (c) The wire shall be fully galvanized

Tensioning fence wires:

All fencing wire shall be carefully strained and hung without sag, and with true alignment, care being exercised not to strain the wire so tightly that it will break, or that end, corner, straining or gate posts will be pulled up. Each strand of fencing wire shall be securely fastened in the correct position to each post with soft galvanised binding wire.

Smooth wire:

- (a) Smooth wire shall comply with the requirements of SANS 675 and shall be of the types specified below:
- (b) Straining wire shall be 4,0 mm diameter and fully galvanized.
- (c) Fencing wire shall be high tensile grade, 2,24 mm diameter wire fully galvanized.
- (d) Tying wire shall be 2,5 mm diameter, mild steel, galvanized wire for tying fencing wire to standards and droppers, and 1,6 mm diameter, mild steel, galvanized wire for tying netting and mesh wire to fencing wire.

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 or natural anodised aluminium 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 panelling:**

- (a) Description of material to be used:

- (i) Description of item and/or position to
be fixed Unit m, m², 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) Skirtings, 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: m²
- (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: m²
- (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 Alterations and repairs to existing structures:

(a) Indicate if repairs, replace, alterations, removal or sealing, etc:

- (i) Description of individual items to be repaired,
altered, removed, sealed, etcUnit: m³, m², 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 maintain materials and components such as removal of existing floors and installation of new floor coverings, skirtings, 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:

PW 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

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 PW 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 skirtings, nosings, etc, shall be carried out in accordance with SANS 1043 and section 10, clause 10.3 of PW 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 PW 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 granitic 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 skirtings 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 skirtings and/or quarter rounds for re-use where vinyl tiles are laid against walls. Reinstate skirtings 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 skirtings 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 Skirtings

Loosened hardwood skirtings 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 skirtings 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 skirtings 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, skirtings 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 skirtings 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 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.

BE 03.02 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 sub-base 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, eg 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 sub-base and/or sub-grade 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 sub-grade 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 sub-grade or sub-base 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 sub-grade, sub-base, etc, to ensure that the required compaction is being attained.

BE 03.02.02 Laying of segmental block paving

The existing blocks shall be preselected 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 preselected 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 meter.

Precast concrete curbs and channels shall comply with SANS 927, generally in 1 meter 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 sub-base 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 soil applied herbicide with long residual action for the control of broad leaf weeds and grasses, containing active ingredient Bromacil, 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

Maintenance requirements will be itemised in the Bill of Quantities and will be instructed to the Contractor.

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 re-fixed 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 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 ie industrial type extruded/split ceramic 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: m²

(b) Etc. for other thicknesses

The unit of measurement shall be the square metre of floor screed laid, as specified, on floors, steps or areas shown on the Drawings or as designated by the Engineer.

The tendered rates shall include full compensation for the construction of the floor screeds, including the supply of all materials, mixing, laying, finishing, the forming of nosings, readings, skirtings, etc.

BE.02 Joinery:

(a) Items measured by number:

(i) Doors (type and size indicatedUnit: number

(ii) Etc. for other items measured by number

(b) Items measured by linear metre:

(i) Skirtings (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: m²

(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: m²

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, cleaning or sealing, etc:

(i) Description of individual items to be repaired,
altered, removed, sealed, etc Unit: m³, m², 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, clean and seal, 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 perform corrective maintenance repairs to 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:

PW 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

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, eg 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, eg 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, eg 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, eg 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: m²
- (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 : m²
- (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.

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, etcUnit: m³, m², 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.

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

0.TECHNICAL SPECIFICATION

BJ PAINTWORK

CONTENTS

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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

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: m², 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: m², 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: m², 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: m², 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

CA ROADS

CONTENTS

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CA 03	OPERATING AND MAINTENANCE MANUALS
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CA 01 SCOPE

This specification covers the materials, equipment, methods, testing and work required for the repair and maintenance of existing roadways, parking areas, miscellaneous areas subjected to vehicular traffic and other miscellaneous paved areas. It covers both surfaced and unsurfaced roadways and includes appurtenant works such as kerbing, road markings and road signs.

This specification shall form an integral part of the repair and maintenance 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.

CA 02 **STANDARD SPECIFICATIONS**

CA 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:

OW 371	-	Specification of Materials and Methods to be used, fourth edition, October 1993
SANS 1200 D	-	Earthworks
SANS 1200 DM	-	Earthworks (roads, subgrade)
SANS 1200 M	-	Roads (general)
SANS 1200 ME	-	Subbase
SANS 1200 MF	-	Base
SANS 1200 MG	-	Bituminous surface treatment
SANS 1200 MH	-	Asphalt base and surfacing
SANS 1200 MJ	-	Segmented paving
SANS 1200 MK	-	Kerbing and channelling
SANS 1200 MM	-	Ancillary roadworks
COLTO Standard specifications for road and bridge works for state road authorities		

CA 02.02 **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.

CA 02.03 **MANUFACTURERS' SPECIFICATIONS, CODES OF PRACTICE AND INSTALLATION INSTRUCTIONS**

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

CA 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.

CA 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.

CA 04 **EXECUTION OF REPAIR WORK**

CA 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 repair and maintenance 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 details specified in the Particular Specification.

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 twelve (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 to the satisfaction of the Engineer.

Repair work items for the existing roadways, parking areas, miscellaneous areas subject to vehicular traffic and other paved areas shall be categorised under the following headings:

- (a) Repair of gravel wearing course and shoulders
- (b) Surface repairs of concrete pavements
- (c) Pavement layers and surface repairs
- (d) Surface patching of surfaced roads
- (e) Construction of thin bituminous surfacings
- (f) Repair of segmented paving
- (g) Repair of kerbing
- (h) Erection and repair of road traffic signs
- (i) Road markings
- (j) Chemical control of vegetation and eradication of undesirable vegetation.

CA 04.02 REPAIR OF GRAVEL WEARING COURSE AND SHOULDERS

This section covers the reprocessing or replacement of an existing gravel wearing course or road shoulder over part of or over the full road width or parking area.

CA 04.02.01 Construction

The Engineer will demarcate any areas to be repaired, and shall instruct the Contractor with regard to the repair work to be done.

The reshaped wearing course shall be constructed true to line, level and cross-section as shown on the drawings or as directed by the Engineer.

The reshaping process shall in general be carried out using the existing wearing course. This material shall be graded to form the correct road profile. If necessary, the Engineer shall instruct the Contractor to rip, redistribute and recompact the wearing course in order to achieve the correct road profile.

Unsuitable or excess material from the road prism shall be removed from the site to spoil. Any shortfall in material shall be made up by importing suitable material.

Material which is ripped or imported shall be placed, watered, mixed and compacted to a minimum of 93% of modified AASHTO density.

The Contractor's attention is specifically drawn to the requirement that only material approved by the Engineer may be imported.

During the reshaping process, the roadside drains and cut and fill slopes shall be trimmed and finished true to line, level and cross-section. No additional payment will be made for trimming and finishing of cut and fill slopes.

CA 04.02.02 Quality standard

The gravel wearing course shall be constructed true to line, level and cross-section as shown on the drawings or as directed by the Engineer.

CA 04.02.03 Materials

The materials shall comply with SANS 1200 ME and the additional requirements detailed below:

Additional material requirements for wearing course - natural gravel

Maximum size	37,5 mm
Oversize index (I_o) ^a	≤ 5 per cent
Shrinkage product (S_p) ^b	100 - 365 (maximum of 240 preferable)
Grading coefficient (G_c) ^c	16 – 34
CBR: ≥ 35 ≥ at 95 per cent modified AASHTO compaction and OMC ^d	

- a) I_o = Oversize index (per cent retained on 37,5 mm sieve)
b) S_p = Linear shrinkage x per cent passing 0,425 mm sieve
c) G_c = (Per cent passing 26,5 mm - per cent passing 2,0 mm) x per cent passing 4,75 mm/100
d) Tested immediately after compaction

CA 04.03 SURFACE REPAIRS OF CONCRETE PAVEMENTS

This section covers the repair of spalled concrete at joints, the forming and sealing of new joints and the sealing or resealing of existing joints and random cracks in existing concrete pavements, and the patching of existing concrete.

Repairs to concrete are regarded as specialist work and shall be undertaken by approved subcontractors with relevant experience.

CA 04.03.01 Construction

Patching, resealing of joints and sealing of cracks in concrete pavements shall be done at the positions indicated by the Engineer.

- (a) Resealing of joints and cracks

(i) Preparation of joints for resealing

The old deteriorated sealant in the top of the joint to be resealed shall be cut or scraped loose from each joint face with equipment that will not damage joint edges or the concrete surface. Care shall be taken not to damage, spall or bevel the joint edges.

The joints shall be initially cleaned to the full depth of the old sealant plus its backing material, as well as of all foreign material in the joints. A vacuum process, and not compressed air, shall be used to remove all loosened material from the joints. The Contractor shall continuously remove debris from the road surface and keep the surface clean. After the removal of the old material has been completed, refacing of the joint planes shall be done with an abrasive wheel or a power-driven concrete saw to widen each face of the sealant reservoir portion of the joint by a minimum of 2,0 mm and a maximum of 5,0 mm. No sealant may be applied to other than freshly cut concrete faces. The freshly cut concrete faces shall be degreased to such extent that adhesion of the sealant to the concrete in every respect satisfies the sealant manufacturer's guarantee.

Immediately after the sawing operation, the joint grooves shall be thoroughly vacuumed and washed out with a jet of clean water to remove all remaining loose material resulting from the sawing operation. Any slurry resulting from the wet sawing shall be removed from the road surface.

Sweeping up old joint material and other debris with hand brooms shall be a continuous process during joint preparation. The joints shall be finally cleaned again prior to resealing, but in no case shall the cleaning precede the sealant by more than 30 m of joint length.

(ii) Preparation of cracks for sealing

Sealing shall be considered only for cracks that are open wide enough to permit entry of joint sealant or mechanical routing tools. The decision of whether a crack is to be sealed or not shall rest with the Engineer. Sealant in previously sealed cracks shall be removed as described in subclause CA 04.03.01(a)(i) above.

A groove of at least 12 mm wide by 18 mm deep shall be made along the crack with a machine capable of closely following the path of the crack without causing excessive spalling or other damage to the adjacent concrete. Cleaning of the cracks after the grooving operation shall be done as described in subclause CA 04.03.01(a)(i) above.

(b) Patching of concrete

Patching of concrete shall be done where indicated by the Engineer.

Unless otherwise instructed by the Engineer, the patching shall have a neat rectangular shape with sides parallel to existing joints. The concrete within the area to be patched shall be broken up and removed to its full depth. The vertical face of the existing concrete adjacent to the patch shall be planed with an abrasive wheel or power-driven concrete saw, if necessary, to provide a smooth face.

Immediately prior to the placing of new concrete, the surface of the underlying pavement layer shall be compacted with either hand or mechanical equipment, depending on the space available, to ensure a firm foundation surface.

An isolation joint shall be constructed between all interfaces of existing and new concrete. The isolation joint shall consist of a joint filler, a bond breaking strip and a polysulphide sealant. The isolation joint shall only be sealed between 21 and 28 days after the casting of the concrete, at which time the uppermost portion of the joint filler shall be raked out, the bond breaking strip inserted and the polysulphide sealant applied.

As the patching of concrete will generally occur in trafficked areas, the Contractor shall allow fully in the relevant rates for accommodation of traffic to enable safe construction conditions. No additional payment will be made over and above the tendered rates for the work.

No traffic shall be allowed over concrete patches for a period of seven (7) days after casting.

CA 04.03.02 Materials

(a) Polysulphide sealant

The polysulphide sealant shall be a two-component material that complies with the requirements of SANS 110.

(b) Additional materials for polysulphide sealant

(a) The sealant shall be supported by a bond breaker backing strip, and, unless otherwise recommended by the manufacturer and approved by the Engineer, the faces of the joint groove shall first be treated with a primer.

Supporting and priming materials shall be compatible with adjacent materials or surfaces in contact with the materials and shall be in accordance with the manufacturer's recommendations and subject to approval by the Engineer.

Primers, bond breakers and back-up material shall comply with instructions and recommendations issued by the manufacturer of the approved liquid sealant used.

CA 04.03.03 Quality standard

Surface repairs shall be executed and finished strictly in accordance with the prescribed requirements.

Repair work shall be carried out in such a manner as to blend in colour, texture and finish with adjacent concrete surfaces as far as possible.

CA 04.04 PAVEMENT LAYERS AND SURFACE REPAIRS

CA 04.04.01 General

This section covers the work in connection with the repair of localised failures of the pavement layers.

The work comprises excavating the deformed areas and reconstructing the pavement and surfacing layers, including treatment of the floor of the excavation prior to backfilling.

CA 04.04.02 Execution of work

(a) Removal of distressed pavement layers

The Engineer will demarcate any failed areas to be repaired, and shall instruct the Contractor with regard to the repair work to be done. The Contractor shall provide assistance and temporary traffic control facilities for marking out failed sections of the road.

Unless otherwise instructed by the Engineer, the patching shall have a neat rectangular shape, at right angles to the direction of traffic. The existing material shall be excavated and removed to the specified depth. Asphalt layers and surfacing shall be cut with approved cutting equipment.

Excavation for patching shall be cut with sideslopes of approximately 60° to the horizontal.

Excavated material from each pavement layer shall be placed in separate stockpiles adjacent to the patch. The stockpiled material shall be reused or removed from the site in accordance with the Engineer's instructions.

After completion of the excavation to the specified depth, the Engineer shall be afforded the opportunity to examine the excavation. Where required, the floor of the excavation shall be compacted to the specified density for the layer concerned. These densities as percentages of modified AASHTO density are as follows:

Subbase	(150 - 300 mm below final base course level)	95%
Selected	(300 - 600 mm below final base course level)	93%
Fill	(Lower than 600 mm below final base course level)	90%

Materials excavated from the various pavement layers shall not be contaminated if the reuse of excavated material for backfilling is instructed by the Engineer.

Excavated material shall be removed from the site, unless re-use of material is instructed by the Engineer. Under no circumstances shall excess material be dumped in side drains or side banks.

(b) Backfilling

Prior to backfilling, the base and sides of the excavation shall be cleaned of all loose material. The top 150 mm of all excavations shall be regarded as base and all other backfill up to 500 mm below the final road level shall be regarded as subbase. Deeper excavations shall be backfilled with approved gravel to a density of 90% modified AASHTO density.

Backfilling of the excavation shall be done as follows:

- (i) The Engineer may instruct the Contractor to use cement-stabilized material excavated from the existing pavement as backfilling, either for subbase layers only or for both subbase and base course layers.

Material shall be broken down and 60 kg/m³ of Portland composite cement (Cem II:32,5) shall be added. Water shall be uniformly mixed into the material. The material shall then be returned to the road and compacted to at least 95% of modified AASHTO density for the subbase layers and to 97% of modified AASHTO density for the base layers.

- (ii) Where required by the Engineer, backfilling for the base course layer shall be done with imported material of G3 or better quality, treated with bitumen emulsion. Portland composite cement (Cem II:32,5) shall be added at a rate of 25 kg/m³ and mixed off the road by means of a concrete mixer or hand labour if approved by the Engineer. All mixing shall result in a homogenous mixture of additives and parent material which is to the satisfaction of the Engineer.

Thereafter the material shall be treated with a 60% anionic stable-grade bitumen emulsion diluted with five parts water to one part emulsion and added at a rate of 70 litres/m³ of crushed stone. All mixing shall result in a homogeneous mixture of additives and parent material which is to the satisfaction of the Engineer.

The mixed material shall then be transported to the excavated area, placed and compacted, all within five hours of the commencement of the mixing process. Thereafter 0,6 litres/m² of the diluted 60% bitumen emulsion shall be applied to the base or layer to ensure a sealed surface.

The density of the backfilling of the base layer shall be at least 100% of modified AASHTO density.

- (iii) Where required by the Engineer the backfilling of the base layer shall be done with continuously graded asphalt base compacted to at least 94% of Marshall density.

The excavated areas shall be tacked at a spray rate of 0,40 litre/m² using 60% cationic emulsion. The asphalt base material shall be spread and compacted so that the final surface is neat and uniform.

- (iv) All the backfilling shall be completed in geometric patterns of squares or rectangles and in each case it shall be finished off neatly to 40 mm ± 10 mm below the levels of the surrounding sound road surface.

(c) Surfacing

A tack coat of 60% cationic bitumen emulsion shall be applied to the floor at top of base layer level at a rate of 0,55 litre/m² before backfilling is commenced or as otherwise instructed by the Engineer.

A layer of hot continuously graded medium asphalt shall be applied, compacted to 94% of Marshall density to bring the level of the patch up to final road level.

(d) Alternatives for application of surfacing layer for limited localised repair work

- (i) Where instructed by the Engineer, a cold premixed bituminous mixture may be used for application of the surfacing layer for minor repair works. The mixture shall either be an approved cold mix from commercial sources, or can be prepared and mixed in a suitable concrete or other type of mixer, and shall have the following mix proportions:

(i) 9,5 mm nominal sized aggregate: 1 part

(ii) 6,7 mm nominal sized aggregate: 1 part

(iii) Crusher sand (fine grade): 1 part

(iv) 60% stable mix-grade emulsion (prepared from 80/100 penetration grade: between 75 and 90 litre/m³ aggregate mix bitumen).

Before spreading the mixture, the surface shall be prepared by painting it with one layer of bituminous emulsion at a rate of 0,6 litre/m², which must be allowed to dry. The mixture shall then be placed on the areas to be sealed and screeded off in a layer of uniform thickness. After the emulsion has broken and the layer has attained sufficient stability, it shall be rolled with a small steel-wheeled roller to obtain compaction. The thickness of the layer shall be the same as that of the adjacent seal.

- (ii) Where instructed by the engineer, a commercially available pre-fabricated stone seal with a bitumen rubber binder may be used as final surfacing on minor repair works. The material shall consist of precoated stone chippings of the nominal size as directed by the engineer, held together by a layer of bitumen rubber binder on a workable surface, e.g. treated paper.

Backfilling of the underlying layer works shall be as described in CA 04.05.02 and the top of the base shall be repaired to such a level that the road surface shall be flush with the surrounding surface after repairs have been completed. The top of the base shall be prepared by painting it with one layer of bituminous emulsion at a rate of 0,6 litre/m², which must be allowed to dry (or alternatively according to the supplier's prescriptions).

The surfacing material shall be handled and placed according to the supplier's prescriptions.

(e) Production limitations

As far as it is practically possible the size of the area to be repaired shall be limited to that which can be excavated, backfilled and opened to traffic within a single working day. Where this is impractical the Contractor shall consult with the Engineer regarding the signs requirements for controlling the traffic during night time. No area that is to be prepared, shall be left exposed if rain is imminent.

The asphalt base material shall be placed in layers not exceeding 80 mm and crushed stone material be placed in layers not exceeding 100 mm measured in the loose. The surfacing material shall be placed in one layer at a thickness of 40 mm ± 10 mm.

(f) Testing

Modified AASHTO densities shall be determined using TMH1 Method A16T (Preparation of Material) and Method A7 (Compaction of Material).

CA 04.04.03 Quality standard

The repaired area shall be rectangular in shape.

The edges of the completed surfacing shall not be more than 3 mm above the existing surface. Nowhere shall the edges be below the surrounding road surface.

The thickness of the asphalt surfacing at any point shall be 40 mm ± 10 mm.

The cross-fall of the completed area shall be equal to that of the adjacent surface to within a tolerance of ± 0,5% cross-fall.

When tested with a 3 metre straight edge laid parallel to or at right angles to the road centre line the surface of the area shall not deviate from the bottom of the straight edge by more than 7 mm.

The reconstruction of the pavement layers shall require a standard of workmanship to produce a patch that will not deteriorate within the contract period.

CA 04.04.04 Plant and equipment

All equipment shall be suitable for the specified use and size of working areas and shall be capable of obtaining the specified results.

Only approved cutting or sawing equipment may be used for cutting or sawing asphalt layers. The equipment must be capable of cutting asphalt layers to depths of 200 mm in one operation without fragmenting the material, and in straight lines within the required tolerances.

The following items of plant and equipment shall also be available and in good working order:

- (a) A vibratory roller having a mass approximately equal to that of a Bomag 90 or similar vibratory roller, with an adjustable amplitude and frequency of vibration
- (b) A mobile compressor capable of producing at least 3 m³/minute compressed air at 750 kPa
- (c) Appropriate paving breakers
- (d) Manually-operated pneumatic compactors as required, and
- (e) Appropriate concrete mixers.

CA 04.04.05 Materials

(a) Crushed stone

Crushed stone for use as backfill in patches shall be of G3 or better quality, from an approved commercial source, and shall comply with SANS 1083 in general and the following in particular:

- (i) Plasticity index (maximum) = 6
- (ii) Maximum flakiness index of the -26,5 mm, + 13,2 mm material = 35
- (iii) Maximum aggregate crushing value = 29
- (iv) The grading shall comply with the following grading envelope:

<u>Sieve size</u>	<u>Percentage passing (mass)</u>
37,50	100
26,50	100
19,00	85 - 95
13,20	71 - 84
4,750	42 - 60
2,000	27 - 45
0,425	13 - 27
0,075	5 - 12

(b) Stabilising agent

The stabilising agent shall be Portland composite cement (Cem II:32,5) or Portland blast furnace cement (PBFC complying with SANS 626) and shall comply with requirements of category ENV 197-1.

(c) Hot-mix asphalt base and surfacing mix requirements

The mix shall be a continuously graded asphalt and shall have the properties specified in table CA 04.04.05/1 below:

<p>TABLE CA 04.04.05/1: PROPERTIES FOR CONTINUOUSLY GRADED ASPHALT BASE AND SURFACING</p>

PROPERTY	RANGE
Marshall stability (kN)	8 - 16
Marshall flow (mm)	2 - 4
Stability/Flow (kN/mm)	3 minimum
Static creep modulus (MPa)	60 minimum
Indirect tensile strength @ 25 °C (kPa)	1 000 minimum
Dynamic creep modulus (MPa)	16 minimum
% Air voids	3 - 6
Immersion index%	75 minimum

A 60/70 penetration grade bitumen shall be used and the binder type shall comply with the requirements of SANS 307.

Grading limits and mix proportions are given in table CA 04.04.05/2.

TABLE CA 04.04.05/2: GRADING LIMITS AND MIX PROPORTIONS FOR CONTINUOUSLY GRADED ASPHALT BASE AND SURFACINGS

PERCENTAGE PASSING THROUGH SIEVE BY MASS					
SIEVE SIZE (mm)	ASPHALT BASE		ASPHALT SURFACING		
	37,5 mm maximum	26,5 mm maximum	COARSE	MEDIUM	FINE
53,000	-	-	-	-	-
37,500	100	-	-	-	-
26,500	84 - 94	100	100	-	-
19,000	71 - 84	85 - 95	85 - 100	-	-
13,200		71 - 86	71 - 84	100	
9,500	50 - 67	62 - 78	62 - 76	82 - 100	100
6,700			-	-	-
4,750	36 - 53	42 - 60	42 - 60	54 - 75	64 - 88
2,360	25 - 42	30 - 48	30 - 48	-	-
1,180	17 - 34	22 - 38	22 - 38	27 - 42	35 - 54
0,600		16 - 28	16 - 28	18 - 32	24 - 40
0,300	10 - 22	12 - 20	12 - 20	11 - 23	16 - 28
0,150		8 - 15	8 - 15	7 - 16	10 - 20
0,075	5 - 12	5 - 10	4 - 10	4 - 10	4 - 12
NOMINAL MIX PROPORTIONS (BY MASS)					
Aggregate	94,5%		93,5%	93,0%	93,0%
Bitumen	5%		5,5%	6,0%	6,0%
Active filler	0,5%		1,0%	1,0%	1,0%

(d) Tack coat

The tack coat shall be 60% cationic emulsion complying with SANS 548.

CA 04.04.06 Variation from specified nominal rates of applications or nominal mix proportions

The various sections of these specifications specify nominal rates of applications or nominal mix proportions for materials such as bituminous materials, aggregates, fillers, stabilizing agents, paint and other relevant materials. Tenderers shall base their tenders on these nominal rates of applications and mix proportions.

Where such nominal rates of applications or mix proportions are specified, provision is made for deviations in the quantities of material in consequence of the rates of application or mix proportions prescribed by the Engineer in each particular case in consideration of the available materials and the site.

Where the actual rates of applications or mix proportions used in the works vary from the specified nominal rates and mix proportions, adjustment to compensation will be made as:

- (a) payment to the Contractor in respect of any authorised increase in quantities which exceed those specified and where such increase has been ordered in writing by the Engineer;
- or
- (b) a refund to the Employer in respect of the decrease in quantities that are less than those specified, irrespective of whether such decrease results from an authorised decrease in the rates of applications or mix proportions, or from unauthorised reductions on the part of the Contractor.

Payment for a prescribed rate of application or mix proportion shall be based on the actual rate of application or mix proportion used, provided that this does not exceed the prescribed rate of application or mix proportion, plus any tolerance in the rate of application or mix proportion allowed. If the actual rate of application or mix proportion exceeds the prescribed rate or proportion, payment shall be based on the prescribed rate of application or mix proportion plus any tolerance allowed. If the actual rate of application or mix proportion is below the prescribed rate of application or mix proportion specified or instructed by the Engineer, payment shall be based on the actual rate of application or mix proportion regardless of any tolerance allowed. Notwithstanding the above, the Engineer shall be entitled to reject work which has not been constructed in accordance with the specifications or the rates of applications or mix proportions prescribed by him.

The Employer shall be refunded for any decrease in the specified rates of application or mix proportions at the same rate per unit of measurement as that tendered by the Contractor for additional materials required by an increase in the rates of applications or mix proportions.

CA 04.05 SURFACE PATCHING OF SURFACED ROADS

CA 04.05.01 General

This section covers the repair of potholes and edge breaks that have developed in the surface of surfaced roads, where there is no evidence of base failure. Potholes are local failures covering an area of less than 1 m². The repair of larger areas will be defined as surface repair. Edge break treatment is necessary for finishing off and/or repairing the edges of the paved road, and also for repairing the edges of the road so that they line up with the true edge of the original road or with other edges as may be required. Pay items CA.04.01 and CA.04.04 shall only apply to edge break widths of 200 mm or less. Edge breaks wider than 200 mm shall be classified as surface repair and paid for under items CA.04.02 and CA.04.03.

CA 04.05.02 Execution of work

Pothole and edge break repairs shall consist of trimming away ravelled edges and loose material to the full depth of the pothole or edge break and the backfilling thereof with asphalt.

(a) Excavation

Potholes: The existing material shall be removed in a neat rectangle to sound base, with a minimum dimension of 200 mm x 200 mm. All sides shall be at right angles or parallel to the direction of traffic. The minimum depth of excavation (layer thickness) is 30 mm and the maximum thickness of each layer shall be 50 mm.

Edge breaks: Loose and cracked edges shall be trimmed back in a neat rectangular shape as demarcated by the Engineer, parallel and at right angles to the centre line of the road to sound surrounding surfacing or base and excavated down to sound base. All edges shall be saw cut to a minimum depth of 30 mm below the road surface and the maximum thickness of each layer shall be 50 mm.

(b) Backfilling

After completion of the excavation the Engineer shall be afforded the opportunity to inspect it. The exposed layer shall be trimmed of all undulations to ensure a firm flat base and sides and shall be tacked with 60% cationic stable-grade bitumen emulsion at a rate of 0,6 litre/m². Continuously graded medium asphalt shall be placed and compacted to the level of the existing surrounding surface. The asphalt shall be placed and well compacted in layers not exceeding 40 mm after compaction. The Contractor shall use suitable compaction equipment and shall ensure that 94% of Marshall density is obtained for the mix used, to produce a dense asphalt layer.

Where the excavation ends up deeper than 100 mm below the existing surface the Engineer may order the reinstatement to be executed in accordance with Section CA 04.04: Pavement layers and surface repairs.

Where instructed by the Engineer, a cold premixed bituminous mixture shall be used for limited localised surface patching, compacted level with the surface of the existing surrounding surface.

The mixture shall either be obtained from approved commercial sources or prepared and mixed in a suitable concrete or other approved type of mixer in the following proportions:

- | | |
|--------------------------------------------------------------------------------------------|---------------------------------------------------------|
| (i) 9,5 mm nominal sized aggregate: | 1 part |
| (ii) 6,7 mm nominal sized aggregate: | 1 part |
| (iii) Crusher sand (fine grade): | 1 part |
| (iv) 60% stable mix-grade emulsion
(prepared from 80/100 penetration
grade bitumen): | Between 75 and 90
litre/m ³ aggregate mix |

Before spreading the mixture, the surface shall be prepared by painting it with one layer of bituminous emulsion at a rate of 0,6 litre/m², which shall be allowed to dry. The mixture shall then be placed on the areas to be sealed and screeded off in a layer of uniform thickness. After the emulsion has broken and the layer has attained sufficient stability, it shall be compacted with a steel wheeled roller. The thickness of the layer shall be the same as that of the adjacent seal.

CA 04.05.03 Quality standard

The repaired area shall be rectangular in shape.

The edges of the completed surfacing shall not be more than 3 mm higher than the existing surface. Nowhere shall the edges be below the surrounding road surface.

The thickness of the asphalt surfacing at any point shall be 40 mm ± 10 mm.

The cross-fall of the completed area shall be equal to that of the adjacent surface to within a tolerance of ± 0,5% cross-fall.

When tested with a 3 metre straight edge laid parallel to or at right angles to the road centre line the surface of the area shall not deviate from the bottom of the straight edge by more than 7 mm.

The reconstruction of the pavement layers shall require a standard of workmanship such that a patch will not deteriorate within the contract period.

CA 04.05.04 Material

(a) Tack coat

The tack coat shall be 60% cationic emulsion complying with the requirements of SANS 548 and shall be applied at a rate of 0,6 litre/m².

(b) Surfacing material

The asphalt shall be a continuously graded medium asphalt either mixed on site or obtained from commercial sources. The asphalt mix to be used shall have the mix properties as specified in table CA 04.04.05/1.

A 60/70 penetration grade bitumen shall be used and the binder type shall comply with the requirements of SANS 307.

Grading limits and mix proportions for continuously graded asphalt applying to asphalt surfacing as stated in table CA 04.04.05/2 shall apply to asphalt used for surface patching.

CA 04.06 THIN BITUMINOUS SURFACINGS - SINGLE SEAL

CA 04.06.01 General

This section covers the construction of a bituminous seal consisting of the application of a bituminous tack coat and the spreading and rolling of aggregate as specified, including the required preparation of the existing road surface.

The information contained in this section deals with matters relating to COLTO Section 4300 : Seals : Materials and general requirements, and Section 4400 : Single seals. This section also contains information relevant to where reference is made in the relevant sections of the COLTO specifications to the project specifications, i.e. where a choice of materials or application rates are allowed. Also included in this section are additional requirements applicable to this contract.

The nominal rates of application are for tendering purposes only and will not necessarily be used in construction. The actual rates of application to be used on the site shall in all cases be as instructed by the engineer.

CA 04.06.02 Materials (COLTO B4302)

(a) Bituminous binders

The binder used in the construction of the single seal under this contract shall be a conventional 80/100 penetration grade bitumen complying with SANS 307.

The binder used in the application of a diluted bitumen emulsion shall be an anionic spray grade bitumen emulsion containing 30% by mass of bitumen.

The binder used in the texture correction slurry shall be an anionic stable grade bitumen emulsion containing 60% by mass of bitumen.

(b) Aggregates for seals

The aggregate used for construction of the single stone seal shall be a 9,5 mm nominal size (Grade 1).

CA 04.06.03 Rates of application (COLTO 4308)

(a) Tack coat

- (b) The nominal rate of application of the conventional bitumen as tack coat for the singel seal shall be taken as 1,0 l/m² for tendering purposes.
Stone chips
- The nominal rate of application of the 9,5 mm stone chips shall be 140 m²/m³ for tendering purposes.
- (c) Texture correction slurry
- The application of the texture correction slurry shall be taken as 500 m²/m³ for tendering purposes.
- (d) Diluted bitumen emulsion
- The nominal rate of application of the diluted bitumen emulsion shall be taken as 0,6 l/m² for tendering purposes.

CA 04.06.04 Precoating of aggregate (COLTO 4403)

All chippings used in the construction of single seals shall be precoated with an approved bitumen-based precoating fluid. The precoating shall be executed as described in clause 4302(d) of the standard specifications and at the rates as specified by the supplier. Precoating of aggregate shall be undertaken adequate time ahead of sealing operations to allow the aggregates to dry out properly before application. No free precoating fluid shall be observed when the aggregate is inspected by hand.

CA 04.07 REPAIR OF SEGMENTED PAVING

This section covers the replacement of an existing area of segmented paving as well as the reprocessing and/or replacement of the underlying pavement layers.

CA 04.07.01 Construction

The Engineer will demarcate any areas to be repaired and shall instruct the Contractor with regard to the repair work to be done.

The demarcated area shall be repaired true to line, level and cross-section as shown on the drawings or as directed by the Engineer.

The demarcated area of damaged segmented paving shall be removed. Unless otherwise instructed by the Engineer the pavement layers shall be reinstated as follows:

- (i) Selected layers shall be of at least a G5 quality and shall be compacted to at least 93% of modified AASHTO density.
- (ii) Material for the subbase layers shall be stabilized with 3% cement and compacted to 95% of modified AASHTO density, and shall be of at least a G5 quality.
- (iii) The material for the base layer shall be stabilized with 5% cement and compacted to at least 97% of modified AASHTO density, and shall be at least a G3 quality.

Pavement layers of segmented paved areas under pedestrian traffic only, shall be excavated and replaced by natural gravel compacted to 93% modified AASHTO density. Damaged concrete edge beams and intermediate beams shall be replaced with class 30 concrete edge beams and intermediate beams similar in dimension to existing undamaged edge beams and intermediate beams in accordance with the relevant SANS specifications or as directed by the Engineer. After the repair of the underlying pavement layers and when the concrete edge beams and intermediate beams have reached sufficient strength, segmented paving blocks, similar to the

existing undamaged segmented paving blocks shall be replaced in accordance with the relevant SANS specifications or as directed by the Engineer.

Unsuitable or excess material shall be removed from the site or to spoil. Any shortfall in material shall be made up by importing suitable material.

The Contractor's attention is specifically drawn to the requirement that only material approved by the Engineer may be imported.

CA 04.07.02 Quality standard

The repaired segmented paving shall be constructed true to line, level and cross-section as shown on the drawings or as directed by the Engineer.

CA 04.08 REPAIR OF KERBING

This section covers the patching and replacing of damaged kerbs

CA 04.08.01 Construction

Where the damage to kerbs can be repaired satisfactorily by surface patching of the kerb units, the Engineer will authorize such work to be done. The contractor shall use products and material approved by the Engineer to repair the authorized kerbs to the satisfaction of the Engineer.

Where kerbs or channel units are severely damaged or have been moved out of position, such units will be replaced with similar undamaged units. Precast units and its installation will comply with the relevant SANS specifications and cast in situ concrete work will be done in accordance with the relevant SANS specifications.

CA 04.08.02 Quality standard

The repaired kerbing shall be constructed true to line, level and cross-section as shown on the drawings or as directed by the Engineer.

CA 04.09 ERECTION AND REPAIR OF ROAD TRAFFIC SIGNS AND TRAFFIC-CONTROL DEVICES

CA 04.09.01 General

This section covers the erection of permanent road traffic signs. It includes the repair and replacement of faded, damaged or not clearly visible existing signboards and reference marker boards.

Specifications relating to manufacturing of road signs are not included in this document, as relevant specifications regarding manufacturing will be issued to a nominated subcontractor who shall be a recognised manufacturer of road signs.

The signs shall be the standard regulatory, guidance, warning and information signs and fabricated in accordance with the South African Road Traffic Signs Manual (July 1993) except where otherwise specified, indicated on drawings or directed by the Engineer.

The erection and placement of any signs, whether temporary or permanent, shall be in accordance with the South African Road Traffic Signs Manual (June 1999).

CA 04.09.02 Storage and handling

All road signs or parts of road signs shall be transported, handled and stored in a weather-proof storeroom in such a manner as to prevent any damage and deformation.

Sign boards shall be stored on blocks in the vertical position so that the signs are not in contact with the ground. There shall be sufficient space between the finished road sign boards to permit

free air circulation and moisture evaporation. Contact of road sign boards with treated timber and diesel, or storage where road sign boards come into contact with dirt or water will not be permitted.

When required, existing or newly erected road signs shall be fully or partially covered with burlap or other approved adequately ventilated material to obscure destinations that are temporarily inapplicable or irrelevant. The covers shall be neatly and firmly fixed in position so that they will be able to withstand strong gusts of wind or eddies caused by passing traffic. The fixing shall be done in a way that will not cause any damage to the road sign face.

CA 04.09.03 Execution of the work

(a) Position

Road signs shall be erected in the positions shown on the drawings or indicated by the Engineer.

(b) Excavation and backfilling

Excavations for the erection of road signs shall be made according to the dimensions shown on the drawings. Where the excavations are to be backfilled with soil, a 1:12 cement/soil mixture (soilcrete) shall be prepared if instructed by the Engineer. The soil or soil-cement mixture shall then be placed at optimum moisture content in 100 mm thick layers in the excavation and shall be compacted to a minimum of 90% of modified AASHTO density.

Where posts or structures are to be fixed in concrete, or where concrete footings are to be cast, the concrete, formwork and reinforcement shall comply with the relevant requirements. The holes shall be completely filled with concrete up to the level shown on the drawings or indicated by the Engineer. The upper surface of the concrete shall be neatly finished with sufficient fall to ensure proper drainage.

This subclause shall apply to ground-mounted signs only. Excavating and backfilling for the foundations of overhead steel structures are specified and regarded as specialised structural work.

Excavation in rock shall be paid for under item CA.07.05.

Where material from the excavations is not suitable for backfilling or for the preparation of soilcrete, suitable material shall be obtained as instructed by the Engineer.

(c) Erection

Road sign boards must be inspected by the Engineer and approved in writing before the boards are taken from the camp site to the erection site. The Contractor shall notify the Engineer at least one (1) week before the said inspections are required.

Road signs shall be erected strictly in accordance with the details and instructions on the drawings and as directed by the Engineer.

During erection the structural steelwork shall be firmly bolted and protected to prevent buckling or damage being caused during erection, or by the equipment used for erection.

Posts to which road signs are to be fixed shall be vertical and the undersides of road signs shall be horizontal after having been erected.

Where timber posts are used for erecting the signs, all holes that are drilled in the timber shall be retreated with the approved preservative. A road sign identification number (as indicated on the layout drawings) shall be painted with white enamel paint on the reverse

side of the road sign board, above the month and year of manufacture, in 50 mm high letters and numbers on the side closest to the road shoulder as directed by the Engineer.

Any sign damaged during transit to the erection site or during the erection process shall be replaced or repaired to the satisfaction of the Engineer at no extra cost to the Employer.

(d) Field welding

All welding done during erection shall comply with the requirements for welding during manufacture.

(e) On-site painting

All painting done after the road signs have been erected shall comply with the requirements for painting during manufacture.

All places where the paintwork has been damaged during erection shall be repaired by the Contractor at his own cost to the satisfaction of the Engineer.

(f) Time of erection

Road signs shall be erected immediately prior to the road being opened to public traffic, unless otherwise decided by the Engineer.

(g) Attachment of overlays

The type of overlay to be used will be specified by the Engineer and will consist either of 1 mm thick Chromadek plate, "pop-riveted" onto the existing sign plate, or System 5 overlay or similar approved.

Before the application of the overlay to any structure, the existing sign board shall be thoroughly cleaned.

(h) Repair of signs

The Engineer may require that certain existing signs be dismantled for repair work or storage and later re-erected. The signs shall be repainted or repaired by replacing the 200 mm profiles or straightening the sheet metal as specified during the manufacturing process. New materials shall be used for part or all of the supporting structure. This work shall be done with as little damage as possible to the signs.

CA 04.09.04 Materials

(a) Timber posts for road sign supports

Timber posts for road sign supports shall conform to the requirements of SANS 754, shall be equal to or better than strength group B timber posts and shall be stamped with the SANS mark. The exposed surface of the cut shall be given two coats of creosote. Any holes drilled in the timber posts after treatment with creosote shall be retreated.

(b) Corrosion-protection tape

Corrosion-protection tape used between aluminium and steel shall be black PVC tape not less than 0,25 mm in thickness, shall be resistant to ultra-violet rays, and shall have an adhesive backing. The breaking strength of the material shall be not less than 3,5 kN/m.

CA 04.09.05 Protection and maintenance

The Contractor shall protect the completed road signs against damage until they have been finally accepted by the Employer, and he shall maintain the road signs until the maintenance certificate has been issued. Damage or defects caused by negligence or faulty workmanship shall be rectified by the Contractor at his own cost to the satisfaction of the Engineer.

CA 04.09.06 Dismantling, storing and re-erecting existing road signs

Where instructed by the Engineer, the Contractor shall dismantle existing road signs, store them, and re-erect them at new positions indicated. This work shall be done taking care to cause as little damage as possible to the signs.

The method applied for dismantling the existing signs and transporting and storing the signs shall be subject to the Engineer's approval. No additional payment shall be made for any equipment or handling methods necessary to prevent damage to existing signs which are suitable for re-use, as instructed by the Engineer.

Where required by the Engineer, the signs shall be repainted or repaired and new materials shall be used for part or all of the supporting structure.

CA 04.10 ROAD MARKINGS

CA 04.10.01 General

This section covers the permanent marking and maintenance of white, yellow or red painted lines or symbols on the road surface by specialist contractors.

CA 04.10.02 Materials

(a) Plant

(i) Road-marking paint

Road-marking paint shall comply with the requirements of SANS 731 for type 1, type 2 or type 4 paint.

The paint shall be delivered at the site in sealed containers bearing the name of the manufacturer and the type of paint. Marking shall be in accordance with SANS 731.

The viscosity of the paint shall be such that it can be applied without being thinned down.

(ii) Retro-reflective road-marking paint

Retro-reflective road-marking paint shall comply with the requirements of CKS 192 and SANS 731.

(iii) Colour

The colours to be used shall be bright white, yellow or red.

The colour of the yellow and red paint shall be as specified in SANS 731.

(iv) Retro-reflective beads

The retro-reflective beads shall be glass beads that comply with the requirements for glass beads specified in CKS 192.

The beads shall be delivered at the site in sealed bags, marked with the name

of the manufacturer, the batch number and an inspection seal of the South African Bureau of Standards (SANS), confirming that the beads form part of a lot that has been tested by the SANS and complies with the requirements of CKS 192. If not, the Contractor shall at all times have an SANS certificate on the site, with details of the batches that make up a lot that has been tested by the SANS, complies with CKS 192 and to which the inspection seal applies.

CA 04.10.03 Weather limitations

Road-marking paint shall not be applied to a damp surface or at temperatures lower than 10 °C, or when, in the opinion of the Engineer, the wind strength is such that it may adversely affect the painting operations.

No road-marking paint may be applied when visibility is dangerously impeded by mist, smoke or smog.

CA 04.10.04 Mechanical equipment for painting

The equipment shall consist of an apparatus for cleaning the surfaces, a mechanical road-painting machine and all additional hand-operated equipment necessary for completing the work. The mechanical road-marking machine shall be capable of painting at least two lines simultaneously and shall apply the paint to a uniform film thickness at the rates of application specified hereinafter. The machine shall be so designed that it will be capable of painting the road markings everywhere to a uniform width with sides within the tolerances specified hereinafter, without the paint running or splashing. The machine shall further be capable of painting lines of different widths by adjusting the spray jets on the machine or by means of additional equipment attached to the machine.

The machine shall be provided with clearly visible amber warning flashing lights which shall always be in operation when the machine is on the road.

CA 04.10.05 Surface preparation

Road markings shall be applied to bituminous surfaces only after sufficient time has elapsed to ensure that damage will not be caused to the painted surface by volatiles evaporating from the seal. After completion of the seal no less than two weeks or such longer period as may be directed by the Engineer shall elapse before any road markings shall be applied. However, the Engineer may, in certain cases, require road markings to be painted without waiting for the seal to harden, in which case it shall be done as soon as possible after the instruction has been given.

Before the paint is applied, the surface shall be clean and dry and completely free from any soil, grease, oil, acid or any other material that will be detrimental to the bond between the paint and the surface. The surface where the paint is to be applied shall be properly cleaned by means of watering, brooming or compressed air if required.

Particular care shall be taken to ensure that the surface shall be clean, where roadstuds are to be fixed.

The Contractor shall take note of conditions which he is unable to rectify by himself and may affect the durability of the paint, and he shall point out these conditions to the Engineer in writing. Disputes arising from such conditions shall be referred to the relevant Regional Engineer for arbitration before road marking commences.

The Contractor shall protect the retro-reflective surfaces of roadstuds when paint is applied and remove the protection immediately after the paint has been applied.

On concrete and bituminous surfaces where polished aggregate is exposed, a tack coat shall be used. On new concrete surfaces any laitance and/or curing compound shall be removed before the markings are applied.

The material shall not be laid over loose debris, mud or similar extraneous matter or over old flaking markings of paint or thermoplastic material. If the road surface is at a temperature of less than 5 °C, or if it is wet, it shall be warmed carefully by a road heater so that, when the material is laid, the surface temperature is above 5 °C and the surface dry.

CA 04.10.06 Setting out the road markings

The lines, symbols, figures or marks shall be premarked by means of paint spots of the same colour as that of the final lines and marks. These paint spots shall be at such intervals as will ensure that the traffic-markings can be accurately applied, and in no case shall they be more than 1,5 m apart. Normally spots of approximately 10 mm in diameter should be sufficient.

The dimensions and positions of road-markings shall be as indicated by the Engineer, specified in the appropriate statutory provisions and the South African Road Traffic Signs Manual.

The repainting of a roadway after the application of a fogspray shall only be done once it is possible to determine the beginning and positions of individual broken line segments. Premarking of such a roadway shall entail the searching for and marking of such broken line segments. Painting shall thereafter be done to the same tolerances as prescribed in CA 04.10.10.

After spotting, the positions of the proposed road markings such as broken lines and the starting and finishing points of barrier lines shall be indicated on the road. These premarkings shall be approved by the Engineer prior to commencement of any painting operations.

The position and outlines of special markings shall be produced on the finished road in chalk and shall be approved by the Engineer before the markings are painted. Approved templates may be used on condition that the positioning of the marking is approved by the Engineer before painting is commenced.

The positions for the beginning and end of all barrier-line road-markings must be suitably indicated by the Engineer before the marking of the road commences.

CA 04.10.07 Applying the paint

The figures, letters, signs, symbols, broken or unbroken lines or other marks shall be painted as shown on the drawings or as directed by the Engineer.

Where the paint is applied by machine, it shall be applied in one layer. Before the road-marking machine is used on the permanent works, the satisfactory operation of the machine shall be demonstrated on a suitable site which is not part of the permanent works. Adjustments to the machine shall be followed by further testing. Only when the machine has been correctly adjusted and its use has been approved by the Engineer after testing, may the machine be used on the permanent work. The operator shall be experienced in the use of the machine.

After the machine has been satisfactorily adjusted, the rate of application shall be checked and adjusted if necessary before application on a large scale is commenced.

Where two or three lines are required next to each other, the lines shall be applied simultaneously by the same machine. The paint shall be stirred before application in accordance with the manufacturer's instructions. Paint shall be applied without the addition of thinners.

Where, under special circumstances, painting is done by hand, it shall be applied in two layers, and the second layer shall not be applied before the first layer has dried out sufficiently. As most road-marking paint reacts with the bitumen surface of the road, the paint shall be applied with one stroke only of the brush or roller.

Ordinary road-marking paint shall be applied at a rate not less than 0,42 litre/m².

Unless otherwise instructed by the Engineer, the road-marking shall be completed before a

particular section of the road is opened to traffic. Each layer of paint shall be continuous over the entire area being painted.

Control sheets with details of the order number, work dates, quantities of paint used and surface areas painted shall be completed by the Contractor for every section of road included in an order. One set of copies of these sheets shall be handed to the Engineer on completion of every individual order.

CA 04.10.09 Applying the retro-reflective beads

Where retro-reflective paint is required, the retro-reflective beads shall be applied by means of a suitable machine in one continuous operation, immediately after the paint has been applied. The rate of application of the beads shall be at least 0,8 kg/litre of paint or such other rate as may be directed by the Engineer. Machines that apply the beads by means of gravity only shall not be used. The beads shall be sprayed onto the paint layer by means of a pressure sprayer.

If specified or instructed by the Engineer, additional surface reflectorization of plastic road-markings shall be applied at a rate and according to the methods specified in BS 3262, 1987, part 3.

CA 04.10.10 Tolerances

Road-markings shall be constructed to an accuracy within the tolerances given below:

(a) Width

The width of lines and other markings shall not be less than the specified width, nor shall it exceed the specified width by more than 10 mm.

(b) Position

The position of lines, letters, figures, arrows, retro-reflective roadstuds and other markings shall not deviate from the true position by more than 100 mm in the longitudinal and 20 mm in the transverse direction.

When an unbroken line and a broken line are painted alongside each other, the beginning and/or the end of the adjacent lines shall coincide.

When existing lines are repainted, the new marking shall not deviate more than 100 mm in the longitudinal direction and 10 mm in the transverse direction from the existing marking.

(c) Alignment of markings

The alignment of the edges of longitudinal lines shall not deviate from the true alignment by more than 10 mm in 15 m.

(d) Broken lines

The length of segments of broken longitudinal lines shall not be shorter than the specified length or deviate by more than 150 mm from the specified length.

CA 04.10.11 General

In broken lines the length of segments and the gap between segments shall be as indicated on the drawings. If these lengths are altered by the Engineer, the ratio of the lengths of the painted section to the length of the gap between painted sections shall remain the same.

Lines on curves, whether broken or unbroken, shall not consist of chords but shall follow the correct radius.

The Contractor shall provide temporary traffic control facilities at his own cost in accordance with specifications to ensure traffic safety where work is being executed. Property and/or road signs damaged by the Contractor, his personnel or his agents shall be repaired or restored at his own cost to their condition as before the damage.

Only materials intended for use on this Contract may be stored on the site.

CA 04.10.12 Faulty workmanship or materials

If any material that does not comply with the requirements is delivered to the site, or is used in the works, or if any work of an unacceptable quality is carried out, such material or work shall be removed, replaced or repaired as required by the Engineer at the Contractor's own cost.

While work is in progress, tests shall be carried out on materials and/or the quality of work to ensure compliance with the specified requirements. The sampling methods are specified under the appropriate sampling and testing methods. The sampling methods described in TMH5 shall be followed where applicable. (TMH5 is published for the Committee of State Road Authorities by the National Institute for Transport and Road Research - presently the Division of Road and Transport Technology - as part of the series Technical Methods for Highways.)

CA 04.10.13 Protection

After the paint has been applied, the road markings shall be protected against damage by traffic or other causes. The Contractor shall be responsible for erecting, placing and removing all warning boards, flags, cones, barricades and other protective measures that may be necessary in terms of any statutory provisions and/or as may be recommended in the South African Road Traffic Signs Manual and specified in Road Note 13.

CA 04.11 CHEMICAL CONTROL OF VEGETATION AND ERADICATION OF UNDESIRABLE VEGETATION

CA 04.11.01 General

This section covers the eradication of declared and undesirable vegetation, as well as the chemical control of vegetation growth through the application of herbicide.

CA 04.11.02 Execution of work

The eradication of undesired vegetation and chemical control of vegetation growth shall be executed where directed by the written instruction of the Engineer.

Herbicide shall normally only be applied in the spring or summer during the period when the vegetation to be killed is growing strongly.

The Contractor's attention is drawn to the requirement that herbicides may only be applied by duly registered, competent contractors in possession of an AVCASA certificate. Proof of such registration shall be furnished on demand to the Engineer.

The Contractor shall ensure that no damage is caused to other plants inside or adjacent to the treated areas as a consequence of the application of herbicides.

Application shall not be carried out in high winds or wet weather.

The following herbicides may not be used:

- Agents of an explosive, flammable, volatile or corrosive nature
- Sodium chlorate
- Volatile low hormone type herbicides

- Agents which are not registered in the Republic of South Africa.

The Contractor shall state the brand name of the herbicide on which the tendered rate is based, which shall be subject to the approval of the Engineer, prior to the application thereof.

The agent shall be guaranteed to kill at least 90% of the unwanted growth with one application and shall have a residual effect which controls the growth of such vegetation effectively for one growing season.

The herbicide should be strictly applied at the rate recommended by the manufacturer.

(a) Chemical control of vegetation growth

The type of herbicide to be used, the correct spray rate, the method of application and when applied, shall be as specified in the Particular Specifications.

(b) The eradication of weeds

The eradication of declared and undesirable vegetation shall take place during the contract period and may include localised patches of noxious weeds, invader plants and other undesired vegetation.

Subject to the Engineer's approval, certain aspects, such as the treatment of the stumps of felled trees, may be carried out by the Contractor.

The Contractor shall ensure that no damage whatsoever is caused to any plants inside or adjacent to the areas treated as a consequence of the application of the herbicides, either during or after application. This also includes areas outside the road reserve.

The type of weedkiller to be used, the correct application rates and when applied, shall be as specified and according to the manufacturer's instructions.

CA 04.11.03 Quality standard

Eradication of undesired vegetation shall be carried out as specified and to the satisfaction of the Engineer. The herbicide shall be applied at the correct rate to prevent regrowth and the application confined to the undesired vegetation.

Areas shall be left neat and tidy and all vegetation cuttings removed where instructed.

CA 04.11.04 Plant and equipment

Vegetation shall be eradicated using knapsacks or portable weedspray machines.

It is important that the equipment be in good working condition. The equipment shall distribute the herbicide evenly without spilling. The nozzle shall be able to move close to the ground in order to prevent mist spray blowing away and killing plants which have to remain. The equipment shall also be safe for the workers, as well as for the travelling public.

CA 05 MAINTENANCE

This specification must be read in conjunction with Additional Specification SA: General Maintenance.

All components of the roadway infrastructure, which includes the road surface, underlying layer works, kerbing, road markings, road signs, sidewalks and gravel shoulders, shall be maintained during the Contract.

The scope of the maintenance work for the road infrastructure includes the following:

CA 05.01

Residential A:

- (i) *Maintenance of approximately 580 m² of interlocking paving road to residential areas*
- (ii) *Maintenance of approximately 9 059 m² of masonry paving road to residential areas*

CA 05.02

Residential B:

- (i) Maintenance of approximately 480 m² of interlocking paving road to residential areas
- (ii) Maintenance of approximately 2 123 m² of masonry paving road to residential areas

CA 05.03

Male and Female Flats:

- (i) Maintenance of approximately 400 m² of interlocking paving road to residential areas

This description of the road and paved areas to be maintained is not necessarily complete and shall not limit the maintenance work to be carried out by the Contractor under this contract.

Maintenance shall include all repair work, replacing of components, fixing of defects, or any other actions or rectifying measures necessary for complete and safe functioning of the road infrastructure.

Maintenance of the road infrastructure shall also include all other actions related to maintenance, such as temporary accommodation of traffic through and around work areas, and provision of temporary accesses to properties.

Remuneration for maintenance of the complete roadway infrastructure shall be deemed included in the tendered monthly payment for maintenance thereof, and shall be paid as detailed in Additional Specification SA: General Maintenance.

CA 05.01

ROAD INFRASTRUCTURE

Routine maintenance on the road infrastructure shall be carried out as described in table CA 05.01/1.

TABLE CA 05.01/1

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCE FREQUENCY
1	Visually inspect and report on complete installation	Monthly
1	Broom, clean and inspect for pavement failures	Monthly
2	Check, inspect, repair all surface and kerb failures	Two monthly
3	Check, inspect, repair all pavement failures	Six-monthly
4	Blade all gravel roads and parking areas	Six-monthly
5	Inspect and repair gravel shoulders	Six monthly

6	Check, inspect, repair, replace road signs	Six monthly
7	Check, inspect, repair, repaint, replace road markings	Annually
8	Remove loose material from the surface of parking areas by means of mechanical brooming	Six monthly
9	Remove loose material from the road surfaces of by means of mechanical brooming	Six monthly

CA 06 MEASUREMENT AND PAYMENT

CA.01 REPAIR OF GRAVEL WEARING COURSE AND GRAVEL SHOULDERS

CA.01.01 Reshaping the wearing course by:

- (a) Grading only Unit: square metre (m²)
- (b) Ripping, redistributing and compacting Unit: square metre (m²)
- (c) Importing, placing and compacting material from commercial sources Unit: cubic metre (m³)

The unit of measurement for CA.01.01 (a) and (b) shall be the square metre surface area graded or ripped and recompact to a depth of 150 mm, as instructed by the Engineer.

The unit of measurement for CA.01.01 (c) shall be the cubic metre of compacted material imported from commercial sources as instructed by the Engineer and measured in place.

The tendered rates shall include full compensation for providing all plant, labour, equipment and materials required and for reshaping and/or constructing the wearing course as instructed by the Engineer. The tendered rates shall also include full compensation for the cost of testing to ensure the finished wearing course complies with the specified requirements, and for disposing of surplus material.

CA.01.02 Gravel shoulders constructed from gravel taken from cut or borrow, including free-haul up to 1,0 km:

- (a) Compacted to 93% of modified AASHTO density (150 mm compacted layer thickness) Unit: cubic metre (m³)

The unit of measurement shall be the cubic metre of compacted material and the quantity shall be calculated from the authorized dimensions of the completed layer.

The tendered rate shall include full compensation for procuring, as if from soft excavation or pits, breaking down, placing and compacting the material, including transporting the material for a distance of 1,0 km and its removal, disposal and transporting for a distance of 1,0 km, of up to 5% by volume of oversize material, and the protection and maintenance of the layer and the conducting of control tests, all as specified.

CA.01.03 Overhaul on surplus material Unit: cubic metre kilometer (m³.km)

The unit of measurement shall be the cubic metre of material hauled in excess of 1,0 km, the volume determined from the rated capacity of the truck multiplied by the 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.

CA.02 SURFACE REPAIRS OF CONCRETE PAVEMENTS

CA.02.01 Preparation and sealing or resealing of old joints and cracks in existing concrete pavements:

(a) Expansion joints Unit: metre (m)

(b) Construction joints and weakened plane joints:

(i) (Width stated) Unit: metre (m)

(ii) Etc. for other widths Unit: metre (m)

(c) Cracks:

(i) (Width stated) Unit: metre (m)

(ii) Etc. for other widths Unit: metre (m)

The unit of measurement shall be the metre of each type of joint or crack prepared and sealed or resealed. No distinction will be made between joints or cracks through areas where the concrete has been repaired and other joints or cracks.

The tendered rates shall include full compensation for all labour plant, equipment, tools and materials, removing old sealant, backing material and any foreign material, refacing or enlarging the faces by sawing, routing of cracks to the specified dimensions, disposing of all debris, all cleaning work involved, installing back-up material where required, installing the bond breaker, applying the primer and mixing and applying the sealant, ensuring acceptable bond with existing work, and for any other operation needed to complete the work as specified and shown on the drawings.

CA.02.02 Patching of concrete:

(a) (Thickness stated) Unit: square metre (m²)

(b) Etc. for other thicknesses Unit: square metre (m²)

The unit of measurement shall be the square metre of new concrete installed.

The tendered rates shall include full compensation for all the necessary labour, plant, equipment, tools and materials required for breaking out the existing concrete, disposing of the debris, saw cutting existing old concrete, compacting the exposed pavement layer, supplying, placing and finishing off the new concrete, texturing and curing, and constructing isolation joints. The tendered rates shall also include full compensation for providing adequate accommodation of traffic where necessary.

CA.03 PAVEMENT LAYERS AND ASPHALT SURFACE REPAIR

CA.03.01 Excavation in existing pavements for patching Unit: cubic metre (m³)

The unit of measurement shall be the cubic metre of material excavated from the existing pavement irrespective of the type of material. The quantity shall be computed in accordance with the authorised dimensions of the excavation.

The tendered rate shall include full compensation for demarcating the excavation and excavating and disposing and/or stockpiling of the material, including haul over a free-haul distance of 1,0 km.

Payment will not distinguish between the different types of pavement material excavated.

CA.03.02 Backfilling of excavations for patching with:

(a) Cement-stabilized gravel excavated from the

existing pavement:

- (i) Areas up to and including 10 m²Unit: cubic metre (m³)
- (ii) Areas larger than 10 m² up to and including 50 m²Unit: cubic metre (m³)
- (iii) Areas larger than 50 m²Unit: cubic metre (m³)

The unit of measurement shall be the cubic metre of chemically stabilized gravel placed in accordance with the specified requirements. The quantity will be computed in accordance with the authorised dimensions of the layer. No payment shall be made for wasted material.

The tendered rates shall include full compensation for providing all the material, irrespective of its origin, for all mixing, placing, compacting, including the floor, and finishing as specified in this section and other sections of the appropriate specifications, for all transport, work in restricted areas, and also for all machinery, equipment, labour, tack coat, supervision and other incidentals for executing the work as specified.

The tendered rates for chemically stabilized gravel shall also include full compensation for stabilizing and providing the cement.

- (b) Asphalt surfacing (continuously graded medium) Unit: ton (t)

The unit of measurement shall be the ton of asphalt placed in accordance with the specified requirements. The quantity shall be computed in accordance with the certified weighbridge tickets issued in the case of asphalt. No payment shall be made for wasted material.

The tendered rates shall include full compensation for providing all the material, placing, compacting and finishing as specified, for work in restricted areas, and also for all machinery, equipment, labour, priming (if specified), tack coat, supervision and other incidentals for executing the work as specified. Unless specified, transportation cost will be included in the rate.

CA.03.03 Supply and apply proprietary brand bitumen rubber 9 mm single seal surface patches (Roadpatch or similar approved material)

The unit of measurement shall be the square metre of surface repaired in accordance with the specified requirements. No payment will be made for wasted materials.

The tendered rate shall include full compensation for providing all material, preparation, placing and finishing as specified in this section and other sections of the appropriate specifications, for all transport, work in restricted areas, and also for all equipment, labour, tack coat, supervision and other incidentals for executing the work as specified.

CA.04 SURFACE TREATMENT OF SURFACED ROADS

CA.04.01 Trimming the edges and edge breaks of the existing surfacingUnit: metre (m)

The unit of measurement for trimming the edges shall be a metre of pavement edge cut back and trimmed as specified measured along the centre line of the road.

The tendered rate for trimming the edges shall include full compensation for cutting back the edges in accordance with instructions, excavating the material to the specified depth and removing all excavated and loose material. Payment for the backfilling of the edge breaks with hot-mix continuously graded asphalt will be made under item CA.04.04.

The tendered rates shall include full compensation for all transport, handling, labour, material and all incidentals necessary for completing all the work in accordance with the specifications, and also for work in restricted areas.

CA.04.02 Pothole repair using hot-mix continuously graded asphalt Unit: ton (t)

The unit of measurement for repairing surfacing shall be the ton of asphalt applied for the repair of the surfacing, irrespective of the thickness or number of layers.

The tendered rates shall include full compensation for procuring, furnishing, and storing of all materials, providing and transporting all plant, labour and equipment necessary for cutting back the edges, excavation, removing excavated and loose material and disposal thereof, priming, backfilling with the approved product, compaction and trimming as specified in this section.

The quantity shall be calculated by measuring the volume of material used, multiplied by the density of the compacted material.

CA.04.03 Pothole repair using cold mix asphalt surfacing from the following sources:

(a) Commercial sources Unit: ton (t)

(b) Mixed on site as specified Unit: ton (t)

The unit of measurement for surfacing repair shall be the ton of cold mix asphalt applied for the repair of surfacing, irrespective of the thickness or number of layers.

The tendered rates shall include full compensation for procuring, furnishing, and storing of all materials, providing and transporting all plant, labour and equipment necessary for cutting back the edges, excavation, removing excavated and loose material and disposal thereof, priming, backfilling with the approved product, compaction and trimming as specified in this section.

The quantity shall be calculated by measuring the volume of material used, multiplied by the density of the compacted material.

CA.04.04 Repairing edge breaks using hot-mix continuously graded asphalt - medium grade Unit: ton (t)

The unit of measurement for repairing edge breaks shall be the ton of asphalt applied for the repair of edge breaks, irrespective of the thickness or number of layers.

The tendered rates shall include full compensation for compacting the surface on which the new edge is to be constructed, procuring, furnishing, and mixing all materials and compacting and trimming the asphalt to the required lines and levels. It shall also include full compensation for applying a tack coat of emulsion to the surface to be treated.

The tendered rates shall include full compensation for all transport, handling, labour, material and all incidentals necessary to complete all the work as specified.

The quantity shall be calculated by measuring the volume of material used, multiplied by the density of the compacted material. No extra payment will be made in regard to this item for producing small quantities of asphalt.

CA.04.05 Mechanical brooming of road surfaces Unit: square metre (m²)

The unit of measurement for the mechanical brooming of the road surface shall be the area of road swept, measured in square metres.

The tendered rate shall include full compensation for the provision of all equipment, use and maintenance thereof and all labour costs.

CA.04.06 Cleaning of cracks with compressed air Unit: kilometre (km)

The unit of measurement for cleaning the cracks with compressed air shall be the kilometre of road along which all cracks have been blown clean.

The tendered rate shall include full compensation for the provision of all equipment, labour, supervision and incidentals for blowing clean the cracks over the full width of the road.

CA.04.07 Applying bituminous binders and herbicides for sealing cracks

(a) Herbicide Unit: litre (ℓ)

(b) MSP/1 or similar prime Unit: litre (ℓ)

(c) Anionic stable-grade emulsion mixed with synthetic modifiers Unit: litre (ℓ)

(d) Hot bitumen rubber Unit: litre (ℓ)

(e) Other specified agents (type indicated) Unit: litre (ℓ)

The unit of measurement shall be the litre of material applied as specified or instructed by the engineer.

The tendered rate shall include full compensation for providing, mixing, heating (where required) and applying all materials as specified, and for all equipment, labour, supervision and incidentals for completing the work. No additional payment will be made for multiple applications of material, and payment will not distinguish between the various types, widths or lengths of cracks.

CA.05 REPAIR OF SEGMENTED PAVING

CA.05.01 Remove concrete paving blocks:

(a) Discard paving blocks Unit: square metre (m²)

(b) Stockpile and re-use paving blocks Unit: square metre (m²)

The unit of measurement shall be the square metre of paving blocks removed from the existing pavement, including the bedding sand. The quantity shall be computed in accordance with the authorised dimensions of the affected area.

The tendered rate shall include full compensation for demarcating the affected area and excavating and disposing and/or stockpiling of the material, including haul over a free-haul distance of 1,0 km.

CA.05.02 Excavation for repair of segmented paving:

(a) Material excavated Unit: cubic metre (m³)

The unit of measurement shall be the cubic metre of material excavated from the existing pavement irrespective of the type of material and excluding the volume of the removed paving blocks and bedding material. The quantity shall be computed in accordance with the authorised dimensions of the excavation.

The tendered rate shall include full compensation for demarcating the excavation and excavating and disposing and/or stockpiling of the material, including haul over a free-haul distance of 1,0 km.

CA.05.03 Backfilling and reinstatement of pavement layers:

- | | | |
|-----|-------------------------------------------------------------------------------------|-------------------------------------|
| (a) | <u>Selected layers compacted to 93% of modified AASHTO density</u> | Unit: cubic metre (m ³) |
| (b) | <u>Cement stabilized subbase layers compacted to 95% of modified AASHTO density</u> | Unit: cubic metre (m ³) |
| (c) | <u>Cement stabilized base layers compacted to 97% of modified AASHTO density</u> | Unit: cubic metre (m ³) |

The unit of measurement for CA.05.02(a) shall be the cubic metre of gravel material placed and compacted according to authorised dimensions on drawings or as specified by the Engineer.

The unit of measurement for CA.05.02 (b) and (c) shall be the cubic metre of stabilized material placed and compacted according to authorised dimensions.

The tendered rates shall include full compensation for procuring and furnishing, placing, compaction and finishing of materials including stabilizing agent and irrespective of the compaction method, labour, tools and equipment for executing the work to the satisfaction of the Engineer.

CA.05.04 Cast in situ concrete and formwork in edge beams, intermediate beams and kerbing:

- | | | |
|-----|--------------------------------|-------------------------------------|
| (a) | <u>Class 20 concrete</u> | Unit: cubic metre (m ³) |
| (b) | <u>Class 30 concrete</u> | Unit: cubic metre (m ³) |

The unit of measurement shall be the cubic metre of concrete in place. Quantities shall be calculated from the dimensions shown on the drawings or as authorised.

- (b)
- (c) The tendered rates shall include full compensation for procuring and furnishing all the materials, storing the materials, providing all plant, excavation, mixing, transporting, providing and preparing all formwork, placing and compacting the concrete, forming the inserts, construction joints and contraction joints, curing and protecting the concrete, repairing defective surfaces and finishing the concrete surface as specified.

CA.05.05 Breaking up and removing concrete edge beams, intermediate beams, etc. Unit: cubic metre (m³)

The unit of measurement shall be the cubic metre of concrete removed. Quantities shall be calculated from the dimensions shown on the drawings or as authorised.

The tendered rates shall include full compensation for providing all plant, breaking up and excavating the existing concrete, including free-haul of the excavated material up to and including 2 km.

CA.05.06 Steel reinforcement in edge beams, intermediate beams and kerbing:

- | | | |
|-----|--------------------------------------|---------------------|
| (a) | <u>Mild steel bars</u> | Unit: ton (t) |
| (b) | <u>High-tensile steel bars</u> | Unit: ton (t) |
| (c) | <u>Welded steel mesh</u> | Unit: kilogram (kg) |

The unit of measurement for steel bars shall be the ton of reinforcing, and kilogram of welded steel in place in accordance with the drawings or as authorised. Ties, stools and other steel used for positioning the reinforcing steel shall be measured as steel reinforcement.

The tendered rate shall include full compensation for supplying, delivering, cutting, bending, welding, trial weld joints, placing and fixing the steel reinforcement including all tying wire, spacers and waste.

CA.05.07 Concrete block paving:

- (a) class, type and thickness similar to existing pavement for areas carrying vehicular traffic Unit: square metre (m²)
- (b) class, type and thickness similar to existing pavement for areas carrying pedestrian traffic Unit: square metre (m²)
- (c) re-use stockpiled paving blocks (80 mm interlocking on 20 mm bedding sand) Unit: square metre (m²)

The unit of measurement shall be the square metre of completed concrete block paving. The quantity shall be calculated from the dimensions shown on the drawings or authorized by the Engineer.

The tendered rate shall include full compensation for supplying, transporting, delivering and placing of all materials, including spreading and levelling of bedding sand, spreading of jointing sand and brooming into joints, compacting using a plate compactor as specified and removal of excess sand from the pavement. The tendered rate shall also include full compensation for all labour, transport, incidentals and equipment required to perform the work according to the specifications.

CA.05.08 Replacement of jointing sand Unit: square metre (m²)

The unit of measurement for the replacement of jointing sand shall be square metre of existing paving area treated.

The tendered rate shall include full compensation for supplying, delivering, placing, and spreading of jointing sand, brooming into joints, compacting using a plate compactor as specified and removal of excess sand from the pavement. The tendered rate shall also include full compensation for all labour, transport, incidentals and equipment required to perform the work according to the specifications.

CA.06 REPAIR OF KERBING

CA.06.01 Patching of kerbs Unit: metre (m)

The unit of measurement shall be the metre of patched concrete kerbing where patched by an approved product. The quantity shall be calculated from the product of the number of kerb units patched and the length of each unit. Only units authorized by the Engineer will be paid for.

The tendered rate shall include full compensation for furnishing all material and for all work necessary to repair the kerbing as specified.

CA.06.02 Reinstalling pre-cast kerbs Unit: metre (m)

The unit of measurement shall be the metre of precast kerbing complete as constructed, measured along the face of the kerb.

The tendered rate shall include full compensation for preparing of bedding, furnishing and installing all materials and reinstalling existing kerbing irrespective of the type of kerb, all complete as specified.

CA.06.03 Replacing of kerbing

- (a) Barrier kerbs similar to existing
undamaged barrier kerbs..... Unit: metre (m)
- (b) Semi-mountable kerbs similar to existing
undamaged semi mountable kerbs..... Unit: metre (m)
- (c) Mountable kerbs similar to existing
undamaged mountable kerbs Unit: metre (m)

The unit of measurement shall be the metre of replaced precast concrete kerbing. The quantity shall be calculated from the product of the number of kerb units replaced and the length of each unit. Only units authorized by the Engineer will be paid for.

The tendered rate shall include full compensation for removing and carting away the damaged kerb units over a free-haul distance of 1 km and furnishing all material and for all work necessary to replace the kerbing as specified.

- (d) The replacing of kerbs by casting *in situ* concrete will be paid for under items CA.05.04 and CA.05.05.

CA.07 ERECTION AND REPAIR OF ROAD TRAFFIC SIGNS AND TRAFFIC-CONTROL DEVICES

CA.07.01 Erection or reinstatement of road sign boards

- (a) Area not exceeding 2 m² Unit: square metre (m²)

The unit of measurement shall be the square metre of completed road sign erected as required in the Project Specification, instructions or drawings issued by the Engineer.

The tendered rates shall include full compensation for attaching the road signboard to a road sign support structure, or to an overhead road sign support structure or to an overbridged and for all equipment, labour, supervision, nuts, bolts, transport, handling, etc., necessary for the installation of the road sign board.

CA.07.02 Road sign supports (overhead road sign structures excluded)

- (a) Steel tubing of 76 mm diameter and 3 mm wall thickness Unit: metre (m)

The unit of measurement shall be the metre of steel tubing used. Bolts and other accessories shall not be measured.

The tendered rates shall include full compensation for erecting the road sign supports, including all bolts, screws, rivets, welding and accessories, together with the painting and galvanizing required and the provision and treatment of breakaway holes in timber supports.

The tendered rates shall also include full compensation for tying up, clearing, trimming, disposing of material at approved dumping sites provided by the Contractor, and finishing the area around each sign footing.

Overhead road sign supporting structures shall not be measured and paid for under this item, but shall be considered as specialised structural work.

CA.07.03 Excavation and backfilling for road sign supports Unit: cubic metre (m³)

The unit of measurement shall be the cubic metre of excavation measured in place according to the neat dimensions of the footings or excavations as shown on the drawings or as directed by the Engineer. In the case of timber posts not in concrete, the plan area of the excavated hole shall be taken as 0,15 m², irrespective of the actual size of the excavated hole.

The tendered rate shall include full compensation for excavating, backfilling and compacting the backfill material, for the disposal of all surplus excavated material, and for providing the backfill material.

CA.07.04 Extra over item CA.07.03 for cement-treated soil backfill..... Unit: cubic metre (m³)

The unit of measurement shall be the cubic metre.

The tendered rate shall include full compensation for the additional cost of providing and mixing in cement.

CA.07.05 Extra over item CA.07.03 for rock excavation..... Unit: cubic metre (m³)

The unit of measurement shall be the cubic metre.

The tendered rate shall include full compensation for the additional cost of excavating in rock.

CA.07.06 Gravel drainage layer below road sign footings Unit: cubic metre (m³)

The unit of measurement is the cubic metre of compacted gravel placed below road sign footings in accordance with the details on the drawings. The quantity will be calculated from the authorised dimensions, and gravel placed outside the authorised dimensions will not be measured for payment.

The tendered rate shall include full compensation for procuring, furnishing and placing the gravel.

CA.07.07 Hazard plates (600 x 150 mm) Unit: number

The unit of measurement is the number of each size of hazard plate erected complete in accordance with the details on the drawings.

The tendered rate shall include full compensation for excavating, disposing of excavated material (including all haul), erecting and for placing and compacting the soilcrete backfilling.

CA.07.08 Repair of road sign faces Unit: square metre (m²)

The unit of measurement shall be the square metre of sign face repaired on the instruction of the Engineer. Only the portion of the sign face actually repaired shall be measured for payment.

The tendered rate shall include full compensation for procuring and furnishing all the necessary material, labour and equipment and for repairing as specified.

CA.07.09 Movable New Jersey type barriers Unit: metre (m)

The unit of measurement shall be the metre of movable New Jersey type barriers provided and shall include the cost of erection.

The tendered rates shall include full compensation for the supply and initial erection complete with all materials as may be required, for cleaning and maintenance. Units which become unserviceable or are damaged by vehicles shall be replaced upon the instruction of the Engineer.

CA.07.10 Supply and install Sign boards Unit: metre (m)

The unit of measurement is the number of each sign erected or installed complete in accordance with the details on the drawings.

The tendered rates shall include full compensation for erecting the signs, including all bolts, screws, rivets, welding and accessories, together with the painting and galvanizing required and the provision and treatment of breakaway holes in timber supports.

CA.08

ROAD MARKINGS

CA.08.01

Retro-reflective road-marking paint

(a) Longitudinal lines:

(i) 100 mm wide broken or unbroken lines,
white, yellow or red Unit: metre (m)

(ii) 150 mm wide broken or unbroken lines,
white, yellow or red Unit: metre (m)

(iii) Broken or unbroken lines, white or yellow,
other widths Unit: metre (m)

(b) Transverse lines and other markings:

(i) Broken or unbroken lines, white
or yellow Unit: square metre (m²)

(ii) Lettering and symbols, white
or yellow, repainting existing
markings Unit: square metre (m²)

(iii) Traffic island markings, white or yellow
repainting existing markings Unit: square metre (m²)

The unit of measurement for subitem CA.08.01 (a) shall be the metre length of actual painted line at the specified width and in accordance with the instruction by the Engineer.

The unit of measurement for subitem CA.08.01 (b) shall be the square metre of the actual surface area of the lettering, symbols, traffic island markings or lines completed in terms of an official order, measured to the nearest tenth of a square metre.

The tendered rate shall include full compensation for procuring and providing all the necessary labour, constructional plant, tools, equipment and materials, including the retro-reflective beads. The tendered rate shall also include full compensation for surface preparation, for painting the road markings and applying the retro-reflective beads, for protection and temporary traffic control facilities and its maintenance, and for all incidentals necessary to complete the road markings in accordance with the provisions of the contract, including the setting-out of lettering, symbols and traffic island markings, but excluding setting out and premarking the lines.

CA.08.02

Setting out and premarking of lines (excluding traffic island markings, lettering and symbols) Unit: kilometre (km)

The unit of measurement for setting out and premarking lines shall be a kilometre of line set out and premarked. If two or more parallel lines lie in a strip with a maximum width of 1,0 m the setting out and premarking of the lines will be measured once only as if it is a single line.

The tendered rate shall include full compensation for setting out and premarking the lines in accordance with an official order, including all materials, and measured to the nearest tenth of a kilometre.

CA.08.03 Removal of road markings:

- (a) Removal of markings by means of grit-blasting Unit: square metre (m²)
- (b) Removal of markings by other mechanical methods (The tenderer shall state the method he intends to use) Unit: square metre (m²)
- (c) Removal of markings by chemical methods (The tenderer shall state the method he intends to use) Unit: square metre (m²)

The unit of measurement for the removal of road markings shall be a square metre and the quantity paid for is the actual surface area of the markings removed in terms of an official order, measured to the nearest tenth of a square metre.

The tendered rate shall include full compensation for removing the markings, including all material.

CA.09 CHEMICAL CONTROL OF VEGETATION AND ERADICATION OF UNDESIRABLE VEGETATION

**CA.09.01 Chemical control of vegetation
(The tenderer shall state the method he intends to use): Unit: square metre (m²)**

**CA.09.02 Eradication of undesirable vegetation
(The tenderer shall state the method he intends to use): Unit: square metre (m²)**

The unit of measurement for item CA.09.01 and CA.09.02 above shall be the square metre of the area treated as described in these specifications.

The tendered rate shall include full compensation for the supply of chemicals, plant, equipment and labour for the spraying of the chemical liquids in accordance with the manufacturer's specifications.

The tendered rates shall be fully inclusive of any costs arising from restricted working conditions due to the nature of the site or traffic flow.

Payment will be made as follows:

- (a) 60% will be payable after application
- (b) The remaining 40% will be payable once 90% of the vegetation has been controlled to the satisfaction of the Engineer.

TECHNICAL SPECIFICATION

CF SEWERAGE NETWORKS

CONTENTS

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CF 01 **SCOPE**

This specification covers all aspects regarding the general maintenance of sewerage networks which may include the following installations:

- (a) Sewer pipelines and manholes
- (b) Open sewerage channels
- (c) Conservancy tanks.

This specification shall form an integral part of the maintenance and servicing contract document and shall be read in conjunction with portion 3: Additional Specifications included in this document.

CF 02 **STANDARD SPECIFICATIONS**

CF 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 L - Medium-pressure pipelines
- SANS 1200 LB - Bedding (pipes)
- SANS 1200 LC - Cable ducts
- SANS 1200 LD - Sewers

CF 02.02 **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.

CF 02.03 MANUFACTURER'S SPECIFICATIONS, CODES OF PRACTICE AND INSTALLATION INSTRUCTIONS

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

CF 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.

CF 03 OPERATING AND MAINTENANCE MANUALS

1. 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.

CF 04 EXECUTION OF REPAIR WORK

CF 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 repair and maintenance 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 details specified in the Particular Specification.

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 repair work shall be executed within the approved period for repairs to be agreed at the start of the Contract period. All new equipment, materials and systems shall be furnished with a written guarantee with a defects liability period of twelve (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 to the satisfaction of the Engineer.

CF 04.02 REPAIR OF EXISTING PIPELINES AND STRUCTURES

This section covers the work in connection with the construction of sewerage networks and associated sewerage structures such as manholes, cleaning eyes and the like. It also covers the removal and replacement of damaged and broken pipes and sewerage structures, as well as repairs to existing pipes and structures.

CF 04.02.01

General

Repair work to the soil and wastewater drainage system shall be detailed in the Particular Specification and may include the following:

Replacement of damaged, broken, leaking, corroded above-ground and underground pipework and fittings;

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

Repair work to damaged manholes, gullies, cleaning eyes, etc, including builder's work and benching;

Initial unblocking and cleaning of all drainage pipework, traps and gullies;

Repair of sewerage system where necessary;

Provision of additional connections to the sewerage system;

Reinstatement and making good of walls, concrete, road surfaces, etc, to an approved acceptable level where any repair and/or service work have been executed;

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;

Test pipe system and equipment for leakage;

Sewerage 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;

Reinstatement and making good of walls, tiling, floors, concrete, finishes, holes, chases, surfaces, etc, to an acceptable level where repair and/or service work have been executed.

CF 04.02.02

Construction

The Engineer will indicate the location at which sections of pipeline are in need of repair after the appropriate surveys have been completed by the Contractor.

(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 specified 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 for the type and thickness of bedding material as 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.

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 m³ shall be classified as hard material.

Where more than 40 % of any material (by volume) consists of boulders each exceeding 0,10 m³ 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.

Excavation shall be carried out as described for new pipeline installation and the excavated material shall be, if suitable, preserved for backfilling. The damaged pipe materials shall be disposed of where instructed by the Engineer.

(e) Pipe couplings

Repair sections shall be joined utilising existing pipe sockets and collars where possible.

Repair couplings shall be used with the approval of the Engineer.

(f) Laying of vitrified clay pipes and fittings

New sections of vitrified clay pipes shall be laid on granular bed 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.

(g) 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.

(h) 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.

(i) 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.

(j) Construction in existing roads

Road crossings will either be constructed utilising sufficient provision of bypass roads, or they will be done utilising the half width of the road. At all times a through route shall be maintained for all traffic.

(k) Repairing of leaks

Where leaks occur at pipe sockets or collars the effected section will be cut from the pipeline and repaired using repair couplings.

Where obvious leaks occur due to displaced sealing rubbers they will be replaced if the replacement can be done economically by lifting adjacent pipes.

(l) Sewer manholes

All manhole cover frames shall be cast into the concrete cover slabs.

Manholes in trafficable areas shall be provided with heavy duty covers and frames and surrounded by concrete slabs.

(m) Steep sewers

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

(n) External sewers

The sewer outside the boundary of the building complex shall be constructed strictly in accordance with the details and specifications of the Local Authority.

(o) As-built services

Existing drainage invert levels and positions are to be checked against invert levels given on the drawings before work commences. The Engineer must be informed immediately of any discrepancy.

The Contractor shall be responsible for the compilation of as-built plans of sewerage network, showing all pipes, pipe diameters, invert levels and associated structures.

All existing services are to be located and opened before the proposed work commences.

(p) Testing

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

(q) Ingress of foreign material

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

(r) CCTV surveys

Modern technology video surveying equipment and detection equipment shall be utilised to establish blockage problems and positions of such problems.

(s) Proximity to buildings

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

(t) Repair to existing structures

Damaged existing structures shall be demolished to the extent directed by the Engineer on site and the resulting debris shall be spoiled at designated sites.

The reinstatement of damaged sections shall be carried out to the same standards prescribed for new construction and shall be paid for under the relevant items scheduled for new structures.

Provision shall be made for the reinstatement of existing damaged prefabricated concrete half round channels.

(u) Repair to existing channels

Existing channels shall be cleaned. Broken sections of lined channels shall be repaired. Such repair work shall comprise patching of concrete and replacement of precast sections.

CF 04.02.03 **Quality standard**

Pipelines shall be laid at even gradients to the satisfaction of the Engineer and the applicable specifications.

CF 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) Manhole covers

Manhole covers, etc, shall have covers and frames complying with SANS 558.

(b) Vitrified clay pipe and fittings

Vitrified clay pipe 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 EN 295: Vitrified clay pipes and fittings and pipe joints for drains and sewers, 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 respect to above conditions with a 6 m water head.

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

All fittings underground shall consist of vitrified clay and shall comply with SANS 559.

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

CF 04.02.05 Air test for sewer and drains

The following air test 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 Contract, and shall be executed by the Contractor and witnessed by the Engineer.

(a) 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 the table below, it means that the pipeline is leaking 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:

- (i) Air-permeable pipelines such as vitrified clay or asbestos cement should preferably be tested when moist or wet.
- (ii) The trench shall be partially backfilled before the test is carried out. This is required to stop possible temperature variations and to prevent damage to the pipeline during subsequent backfilling operations.
- (iii) The testing equipment shall be shielded from the direct rays of the sun.
- (iv) 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.
- (v) 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 specialised equipment.
- (vi) If the pipeline is below the water table and subjected to external water pressure, the test method should be modified by the Engineer to ensure that the final pressure value is higher than that of the external water pressure acting on the lowest part of the installation.

The minimum times for pressure drop of 250 mm to 125 mm water gauge are given in table CF 04.02.05/1 below.

TABLE CF 04.02.05/1

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 to 58	184,6	0,640 L
150	2 to 57	123,1	1,439 L
200	3 to 56	92,3	2,559 L
225	4 to 26	82,1	3,239 L
250	4 to 55	73,8	3,998 L
300	5 to 54	61,5	5,757 L
375	7 to 23	49,2	8,996 L
450	8 to 51	41,0	12,954 L
525	10 to 20	35,2	17,632 L
600	11 to 49	30,8	23,030 L

CF 04.03**CLEANING OF SEWERAGE NETWORK**

The work involved under this section is the removal of silt, debris and vegetation from within the pipelines and manholes and the general cleaning of areas where leakage has occurred. This can be done either mechanically or chemically according to the more appropriate method as specified by the Engineer.

CF 04.03.01**Construction**

The Contractor shall arrange with the Engineer for an inspection of the pipe route before the cleaning of any pipeline sections is carried out.. Based on the inspection, the Engineer will instruct the Contractor as to which sections of the network require cleaning.

Visual inspections utilising closed-circuit TV cameras will not be required unless deemed essential and will be specifically requested by the Engineer.

Sections of the pipeline may be removed for a more detailed inspection. Such sections shall be repaired as specified in Subclause CF 04.02.02. Sections shall only be cut from the pipeline where specifically instructed by the Engineer.

The method to be applied for the cleaning of the pipelines shall be chemical or mechanical. The method to be used for each section of the pipeline will be instructed by the Engineer.

Material removed from the pipes shall be disposed of as instructed by the Engineer.

Where insufficient scour values are present, the method for scouring of the pipelines shall be discussed and agreed with the Engineer prior to implementation.

CF 04.04 REPAIR OF FITTINGS

CF 04.04.01 Construction

The Engineer will indicate the fittings that are to be repaired, but these fittings shall not be limited to those specifically indicated by the Engineer.

Repair of the following fittings may be required:

- (a) Cleaning eyes
- (b) Permanent plug stoppers
- (c) Channel sections.

CF 05 TESTS AND INSPECTIONS ON COMPLETION OF REPAIR 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 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.

CF 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 submitted to the Engineer at regular intervals as required.

CF 07 MAINTENANCE TO INSTALLATION SYSTEMS AND EQUIPMENT

CF 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, for the specified installations described under the Clause CF 01 of this specification.

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 to be categorised for each maintenance activity under the following headings:

- (a) Sewerage network systems
- (b) Wastewater treatment systems.

CF 07.02**ROUTINE PREVENTATIVE MAINTENANCE**

The 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 table CF 07.02/1. The tendered rate shall include full compensation for all material, plant and labour required in order to perform such maintenance to the satisfaction of the engineer.

These actions and findings shall be logged and reported on the relevant approved schedules and reports.

TABLE CF 07.02/1 – SEWERAGE NETWORK SYSTEM

NO	ROUTINE PREVENTATIVE MAINTENANCE ITEM DESCRIPTION	MAINTENANCE FREQUENCY
1	Visually inspect and report on complete installation	Monthly
2	Check, inspect, repair or replace all manhole covers and frames and builder's work to manholes	Four-monthly
3	Check, inspect and repair manhole benching.	Four-monthly
4	Check, inspect, repair or replace all inspection eye, end caps and cleaning eye covers	Four-monthly
5	Check, inspect, report and unblock any blockage that occurs	Monthly
6	Check, inspect, repair/replace and clean out all equipment traps	Monthly
7	Paint repairs to surface piping and equipment	Annually
8	Survey and resultant repairs and unblocking of all main sewer lines	At start of Contract

9	Check, inspect, repair/replace sewer pipes where necessary to maintain good working condition at all times	Four-monthly
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CF 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.

CF 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 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.

CF 08

MEASUREMENT AND PAYMENT

CF.01

SEWERAGE NETWORKS

CF.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, bedding and back filling of replacement pipeline, cutting to length, finishing, repair of kerbs, road surfaces, accommodation of traffic, excavation in all materials, removal of unsuitable material from the trench and disposal of surplus materials.

2. The tendered rate shall include full compensation for all material, plant and labour required to temporarily by-pass (if required) the pipe section being replaced.

The provision of the materials will be measured separately under CF. 01.02.

CF.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 and for the class of bedding to be used.

CF.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 mmUnit: number
- (ii) Maximum dimension 301 mm - 600 mmUnit: number
- (iii) Maximum dimension 601 mm - 900 mmUnit: number
- (iv) Maximum dimension over 900 mmUnit: 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 mmUnit: number
- (iii) Maximum dimension 601 mm - 900 mmUnit: 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 mmUnit: number
- (iii) Maximum dimension 601 mm - 900 mmUnit: 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 mmUnit: number
- (iii) Maximum dimension 601 mm - 900 mmUnit: 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 cover/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.

CF.01.04 **Manholes and inspection chambers**

CF.01.04.01 Raising or lowering of existing manholes or inspection chambers of all types:

- (a) Raise/lower 0 m up to and including 0,5 mUnit: number
- (b) Raise/lower exceeding 0,5 m up to and including 1 mUnit: number

The unit of measurement shall be the number of manholes/inspection chambers raised/lowered within the specified dimensions.

The tendered rates shall include full compensation for all excavation (including around structures), levelling, temporary timbering, shoring and strutting, for preparing the bottom of the excavation for the manhole beds, the disposal of material, dealing with subsurface or surface water, benching and for other operations necessary for completing the work as specified.

Payment shall distinguish between soft and hard material. The tendered rates shall include full compensation for transporting the excavated material from the site.

CF.01.04.02 Breaking into existing sewer and building a new manhole

(a) Pre-cast concrete manhole:

- (1) Depth exceeding 0,5 m up to and including 1,0 m.....Unit: number
- (2) Depth exceeding 1,0 m up to and including 1,5 m.....Unit: number
- (3) Depth exceeding 1,5 m up to 2,0 m Unit: number

The unit of measurement shall be the number of manholes constructed within the specified dimensions.

The tendered rate shall include full compensation for excavation, building a new manhole over the sewer, breaking into the existing sewer, building the channelization under wet conditions, ensuring the water tightness of the new connection, supplying all the necessary materials, removing surplus material, all labour and equipment required to make the connection, and liaison with the local authorities. Provision for manhole covers shall be made under CF 01.03 payment.

CF.01.04.03 Connecting to existing sewer..... Unit: sum

The tendered sum shall include full compensation for excavation, making an opening in the existing manhole, installing new pipes in the new opening, for breaking out and modifying the channelization inside the manhole to suit the new pipe layout, ensuring the water tightness of the new connection, supplying all the necessary materials, removing surplus material and debris all labour and equipment required to make the connection, and liaison with the local authorities.

CF.01.04.04 Repair of channels..... Unit: metre (m)

The unit of measurement shall be the length of channel section repaired.

The tendered rate shall include full compensation for cleaning, patching, repairing of existing channels, irrespective of diameter and position. The rate shall also include all necessary materials, equipment and labour required.

CF.02 CLEANING OF SEWERAGE NETWORK

CF.02.01 Mechanical cleaning of sewer pipes and structures:

- (a) Up to 150 mmUnit: metre
- (b) 151 mm to 300 mmUnit: metre
- (c) 301 mm to 450 mmUnit: metre
- (d) More than 450 mm.....Unit: metre

The unit of measurement shall be the metre of pipe cleaned, measured once along the soffit of the culvert. For multiple pipes each individual pipe shall be measured separately.

The tendered rates shall include full compensation for removing the material, for disposing of the material in an approved manner and ensuring that the material will not wash into drainage trenches.

CF.02.02 Chemical cleaning of sewer pipes and structures:

- (a) Up to and including 150 mmUnit: metre
 (b) 151 mm to 300 mmUnit: metre
 (c) 301 mm to 450 mmUnit: metre
 (d) More than 450 mmUnit: metre

The unit of measurement shall be the metre of pipe cleaned, measured once along the soffit of the culvert. For multiple pipes each individual pipe shall be measured separately.

The tendered rates shall include full compensation for supply of chemical agents, equipment, labour and the effective application of the cleaning process.

CF.02.03 **Provision of equipment for visual inspection of underground pipe networks** Unit: lump sum

The tendered sum shall include full compensation for the provision of suitable equipment, such as TV surveillance equipment, torches, lights and mirrors, etc, to enable a thorough visual inspection of the pipe network.

CF.02.04 **Use of CCTV surveillance equipment** Unit: metre (m)

The unit of measurement shall be the metre of pipe inspected.

The rate shall be fully inclusive of all associated equipment and interpipe moves and recording equipment.

CF.02.05 **Visual inspection of underground pipe network** Unit: sum

The tendered sum shall include full compensation for all processes necessary to complete a thorough check of the sewer network including lifting and replacing manhole covers, using relevant equipment and any clearing necessary to allow the visual inspection to proceed.

CF.02.06 **Demolition and removal of damaged existing structures:**

- (a) Plain concrete Unit: cubic metre (m³)
 (b) Reinforced concrete Unit: cubic metre (m³)
 (c) Kerbing and channelling Unit: metre (m)
 (d) Pipework Unit: metre (m)

The unit of measurement for CF.02.06(a) and (b) shall be the cubic metre of existing material demolished, determined from 70 % of the rates cubic metre capacity of the truck used to remove the material.

The unit of measurement for CF.02.06(c) and (d) shall be the metre length of kerbing and channelling or pipework removed.

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.

The reinstatement of damaged sections shall be paid for under the relevant items for constructing new structures.

CF.03 **TESTS AND INSPECTIONS**

(a) Pressure testing of pipelines.....Unit: metre

The unit of measurement shall be the length of sewer pipeline tested.

(b) Testing of manholesUnit: number

The unit of measurement shall be the number of manholes tested after repair.

The tendered rates shall include full compensation for all labour, materials, power, fuel, accessories and properly calibrated and certified instruments necessary for carrying out relevant tests as per SANS 1200. Submission of certificates from tests and equipment and any costs involved in obtaining such from relevant authorities shall also be included in the tendered sum.

TECHNICAL SPECIFICATION

CJ SITE KEEPING AND CLEANING

CONTENTS

CJ 01	SCOPE
CJ 02	STANDARD SPECIFICATIONS
CJ 03	EXECUTION OF REPAIR WORK
CJ 04	MAINTENANCE
CJ 05	MEASUREMENT AND PAYMENT

CJ 01 SCOPE

This specification covers the cleaning and site keeping of the facilities at the various installations. The scope of work has been divided into:

- Site keeping; and
- Cleaning of offices and support facilities

CJ 01.02 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.

CJ 01.01 SITE KEEPING

The area where site keeping is to be performed is the area included within the perimeter fence of the applicable installation and all areas falling within fenced-in residential properties (See Table CJ 01.01). Site keeping will include removal of rubble, removal of weeds, shrubs and other objects and cutting of the grass.

CJ 02 STANDARD SPECIFICATIONS

CJ 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.

CODE	DESCRIPTION
CKS 285-1971	Dispensers for paper towels
CKS 340-1979	Plastic Refuse Bags (Disposable)
SANS 1344:2009	Medium duty solvent detergent
SABS 1868	Gel detergent cleaner (non-abrasive)
SANS 1887-1:2008	Tissue paper Part 1: General requirements
SANS 1887-2:2008	Tissue paper Part 2: Toilet paper
SANS 1887-4:2008	Tissue paper Part 4: Paper towels
SANS 1924:2007	Toilet soaps intended for use in dispensers
SANS 60335-1:2007	Household and similar electrical appliances – Safety Part 1: General requirements
SANS 60335-2-67:2003	Household and similar electrical appliances – Safety Part 2-67: Particular requirements for floor treatment and floor cleaning machines, for industrial and commercial use

CJ 02.02 OCCUPATIONAL HEALTH AND SAFETY ACT OF 1993

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.

CJ 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 manufacturer's specifications, instructions and codes of practice.

CJ 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.

CJ 03 EXECUTION OF WORK

CJ 03.01 GENERAL

The Contractor shall ensure that the necessary materials, skilled personnel, tools and equipment are available at all times to accommodate the site keeping and cleaning of the facilities.

The Contractor shall be responsible for cleaning ablution facilities as frequently as necessary to maintain them in a clean and healthy condition. The actions outlined serve only as a benchmark for the cleaning and maintaining of the facilities.

Cleaning activities will include providing all cleaning agents and equipment necessary for cleaning.

Providing of consumables such as toilet paper, hand-wash soap, air fresheners refills, sanitizer refills and plastic refuse bags for all waste bins and sanitary bins will be the responsibility of the Contractor.

CJ 03.02 ABLUTIONS

Each ablution facility shall be equipped with the following equipment:

- 1) Hand Dryer
- 2) Stainless steel air freshener
- 3) Stainless steel toilet paper dispenser units
- 4) Stainless steel shoe bins
- 5) Stainless steel hand soap dispensers
- 6) Stainless steel sanitizer
- 7) Stainless steel paper towel dispenser
- 8) Stainless steel wall bin

CJ 03.02.01 Hand Dryer

The hand dryer unit shall comply with at least the following specifications:

- Blower Output: 450 Watt @ 20,000 rpm
- Air Heater Output: 900 W
- Air Flow Rate: 81 meters per second @ 100 mm from the air outlet nozzle

- Air Temperature: 55 °C @ 100 mm from the air outlet nozzle

The hand dryers units shall be of the wall mounted kind and shall be installed in accordance with the manufacturer's specifications.

CJ 03.02.02 Air Freshener Doser

The stainless steel air freshener dosing units shall be battery operated, wall mounted and lockable. The device shall possess an adjustable automatic timer between at least 5 to 30 minutes and the aerosol spray shall be metered.

CJ 03.02.03 Toilet Paper Dispensing Unit

The stainless steel toilet paper dispensing units shall be able to accommodate two standard size 500 sheet single-ply toilet paper rolls and shall be lockable. The device shall be wall mounted.

CJ 03.02.04 She Bin

One stainless steel she bin shall be supplied for each of the female ablutions. The she bins shall possess a self-closing lid and shall accommodate for plastic bag liners which can be removed and replaced with a new liner.

CJ 03.02.05 Hand Soap Dispenser

There shall be at least one stainless steel liquid hand soap dispenser per ablution. The liquid soap dispenser shall be of the wall mounted kind. The dispenser shall dispense a metered amount of liquid soap.

CJ 03.02.06 Urinal Sanitiser Dispenser

There shall be one stainless steel, battery operated, wall mounted, urinal sanitiser dispenser per urinal. The urinals shall furthermore be maintained with deodorised mats.

CJ 03.02.07 Paper Towel Dispenser

The paper towel dispenser shall comply with CKS 285-1971. The unit shall be a Type 2, closed dispenser designed to dispense paper towels in sheets.

There shall be at least one stainless steel wall mounted paper towel dispenser per ablution.

CJ 03.02.08 Wall Bin

There shall be one stainless steel wall bin per ablution. The wall bin shall possess a self-closing lid and shall accommodate for plastic bag liners which may be removed and replaced with a new liner. The device shall be wall mounted.

CJ 04 MAINTENANCE

CJ 04.01 GENERAL

The maintenance work to be performed under site keeping and cleaning shall be done strictly in accordance with Additional Specification SA: General Maintenance, and as specified in this specification.

Maintenance implies and shall include routine cleaning (which is the equivalent of routine preventative maintenance), routine preventative maintenance of site keeping and cleaning equipment, corrective cleaning (which is the equivalent of corrective maintenance), corrective

maintenance of site keeping and cleaning equipment as well as breakdown maintenance of all site keeping and cleaning equipment.

The maintenance scope in terms of site keeping is set out in table CJ 01.01.01.

The maintenance scope in terms of cleaning is set out in table CJ 01.02

The maintenance scope in terms of equipment is set out in table CJ 01.03.

Monthly maintenance responsibilities for site keeping and cleaning of installations shall commence with access to the site. The maintenance schedules and frequency shall be developed under the maintenance control plan to be implemented by the Contractor.

Remuneration for maintenance of site keeping and cleaning will be deemed included in the tendered monthly payment for maintenance based on the point system, as described in Additional Specification SA: General Maintenance and in accordance with the applicable scheduled in the Pricing Data.

CJ 04.02 ROUTINE PREVENTATIVE MAINTENANCE

The tasks related to routine preventative maintenance work shall include but not be limited to the general actions listed in table CJ 04.02.01 and CJ 04.02.01 and CJ 04.02.03 below.

TABLE CJ 04.02.01: SITE KEEPING

No	ROUTINE PREVENTATIVE MAINTENANCE TASKS	FREQUENCY
1.	Cleaning out of and supply of black refuse bags to all waste bins in public areas.	At least daily
2.	Watering of plants, shrubs, grass and trees	Weekly
3.	Removal of weeds	Weekly
4.	Clearing of weeds and grass along the edges of paved areas.	Weekly
5.	Cutting of grass. <i>No grass to exceed the length of 50 mm.</i>	Monthly
6.	Cutting of grass at residential units. <i>No grass to exceed the length of 30 mm.</i>	Weekly
7.	Restore lawns	Monthly
8.	Trimming of dense shrubs.	2 Monthly
9.	Fertilisation of lawns	Quarterly
10.	Fertilisation of flower beds and trees	Quarterly
11.	Removal of undesirable shrubs	Quarterly
12.	Trimming of trees where branches cause obstruction.	Quarterly

South African National Biodiversity Institute

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No	ROUTINE PREVENTATIVE MAINTENANCE TASKS	FREQUENCY
13.	Collecting of litter and foreign objects.	Continuous

TABLE CJ 04.02.02: CLEANING OF OFFICES AND SUPPORT FACILITIES

	ACTION	FREQUENCY
1.	Cleaning of floors in public areas and open plan offices	Daily (before opening of port of entry)
2.	Cleaning of counter tops and under counter shelves in public areas and open plan offices.	Daily (before opening of port of entry)
3.	Emptying of waste baskets in offices and service buildings	Daily
4.	Cleaning of office floors	Daily
5.	Cleaning of floors at public areas of operational buildings	Continuous
6.	Vacuum carpets	Weekly
7.	Clean carpets	Annually
8.	Washing of windows and dusting of window sills and ledges	Weekly
9.	Clean and polish all fittings	Weekly
10.	Washing of walls	Monthly
11.	Dusting of interior of the building to remove dust and spider webs	Weekly

TABLE CJ 04.02.03: CLEANING OF ABLUTION FACILITIES

	ACTION	FREQUENCY
1.	Cleaning and ensuring that the ablution facilities are in a sanitary condition	Continuous
2.	Washing and cleaning of floors	Continuous
3.	Empty and clean all waste receptacles	Continuous
4.	Clean all bowls, basins and urinals	Daily
5.	Clean and polish all fittings and mirrors	Daily
6.	Washing and cleaning out of the bins	Twice weekly
7.	Washing of windows and dusting of window sills, ledges, pipes and fittings	Weekly
8.	Washing of walls	Weekly

	ACTION	FREQUENCY
9.	Dusting of interior of the building to remove dust and spider webs	Weekly

CJ 04.03 SITE KEEPING AND CLEANING EQUIPMENT

All site keeping and cleaning equipment will be supplied by the Contractor and shall be maintained in a perfect working order for the duration of the Contract period. Remuneration for provision of cleaning equipment will be deemed included in the monthly tendered monthly payment for maintenance based on the point system, as described in Additional Specification SA: General Maintenance.

CJ 04.03.01 Grass, Shrub and Tree Cutting Equipment

Distinction will be made amongst 4 different types of grass, shrub and tree cutting equipment:

1. Light duty grass and shrub cutter (Weed Eater)

The light duty grass and shrub cutter shall be similar to a light duty Brushcutter and comply with the following:

Nylon or blade head;
Minimum displacement of 40.2 cm³;
Minimum power output of 1.6 kW; and
Length of 1.77 m.

2. Heavy duty shrub and tree cutter

The heavy duty shrub and tree cutter shall be similar to a heavy duty Brushcutter and comply with the following:

Blade head;
Minimum displacement of 51.7 cm³;
Minimum power output of 2.4 kW;
Length of 1.69 m.

3. Lawn mower for small lawns

The lawn mower for small lawns to be used at the residential areas shall comply with at least the following:

Walk behind 4 stroke petrol self-propelled rotary mower;
Power output of 4 kW;
422 mm cutting width;
200 mm heavy duty sealed ball bearing wheels; and
54-liter polymer catcher with metal lining.

4. Lawn mower for large lawns

The lawn mower for large lawns shall comply with at least the following:

Walk behind 4 stroke petrol self-propelled rotary mower;
Power output of 12 kW;
750 mm cutting width;
Rubber wheels.

CJ 04.03.02 Vacuum Cleaner

Vacuum cleaners shall be wet and dry and comply with at least the following:

Tank capacity: 25 liter
Cable length: 10 m
Airflow rate: 56 liter per second

CJ 04.03.03 Carpet Cleaner

Carpet cleaners shall comply with at least the following:

Tank capacity fresh water: 40 liter
Tank capacity dirty water: 25 liter
Cable length: 10 m
Suction motor: 2 x 1250 W;
Airflow rate: 2 x 60 liter per second
Pump delivery: 2.8 liter per minute @ 3 bar

Carpet cleaners shall be similar to Wetrok's Extravac 400.

CJ 04.03.04 Mop and bucket system

A two bucket mopping system shall be provided and be fitted with metal wringers. The mops provided shall be suitable for use with the buckets provided.

Mop and bucket systems shall be similar to Wetroks Socar L40.

The contractor shall furthermore make use of Rubbermaid microfiber pulse mops for the cleaning of office floors etc.

CJ 04.03.05 Window cleaning kit

Window cleaners shall have a telescopic handle with a length of 0.5 to 3 m. It shall be possible to fit squeegees and brushes to the telescopic handle as required in order to clean windows. A bucket with capacity of at least 10 liter shall be provided that is suitable for use with the window cleaning kit.

CJ 04.03.06 Sign boards

Sign boards shall be yellow in colour, free standing and printed on both sides. It shall clearly indicate the dangerous situation.

CJ 04.04 CONSUMABLES FOR SITE KEEPING AND CLEANING

Provision of consumables will be the responsibility of the Contractor. Remuneration for provision of consumables will be deemed included in the monthly tendered monthly payment for maintenance based on the point system, as described in Additional Specification SA: General Maintenance.

CJ 04.04.01 Refuse Bags

Refuse bags shall comply with CKS 340-1979.

CJ 04.04.02 Toilet Paper

Toilet paper shall comply with SANS 1887 Part 1 & Part 2.

Toilet paper provided shall be single-ply, soft with a nominal number of 500 sheets per roll and a nominal outside diameter of 125 mm.

CJ 04.04.03 Toilet soap for hand soap dispensers

Toilet soap shall comply with SANS 1924:2007 – Toilet soaps intended for use in dispensers.

Toilet soap shall be Type 1, liquid toilet soap and shall be perfumed. The toilet soap shall be suitable for use in the hand soap dispensers provided.

CJ 04.04.04 Biological detergent for urinal dispenser

The urinal dispenser detergent may not contain any disinfectants. A biological detergent shall be used. The biological detergent shall have an EU ECO-LABEL accreditation and shall be endorsed by Indalo Yethu (South Africa's official environmental campaign)

The biological detergent shall be similar to nu flush from innu-science.

CJ 04.04.05 Air freshener

Air freshener shall be supplied that is suitable for use in the air freshener doser.

Air fresheners shall be similar to Technical Concepts Neutrale Metered Aerosols (available from Steiner Hygiene).

CJ 04.04.06 SHE bin liners

She bin liners shall be provided that is suitable for use in the she bins.

CJ 04.04.07 Paper towels

Paper towels shall comply with SANS 1887 Part 1 & Part 4.

Paper towels provided shall be supplied in packets of folded towels that can be dispensed from the supplied paper towel dispenser without sticking or other undue difficulty.

CJ 04.04.08 Wall bin liners

Wall bin liners shall be provided that is suitable for use in the wall bins.

CJ 04.04.10 Biological detergents for cleaning of ablutions and public areas

Disinfectants and Detergent-disinfectants shall not be allowed to clean ablutions and public areas.

A biological detergent shall be used. The biological detergent shall have an EU ECO-LABEL accreditation and shall be endorsed by Indalo Yethu (South Africa's official environmental campaign)

The following detergents to be utilized for the cleaning of public ablutions and staff ablutions:

Indusan Sanitizer all-purpose Cleaner
Prosan XP Sanitary all-purpose Cleaner for cleaning of bathroom floors, walls and surfaces.
Prevent limescale build up and leaves behind a shiny streak free gloss.
Probio (MK) Biological Cleaner for odour control in sanitary areas and toilets.
Pro-restore Floor Maintainer.
Procol MK toilet bowl cleaner for the removal of lime scale and urinary stains with a deodorizing and bacterial action.
Sinotol Sachets Disincentive Cleaner for floors, toilets and cleaning equipment.

The biological detergent shall be similar to nu kleen smell from innu-science and industro clean.

CJ 04.04.11 Medium duty solvent detergent

Medium duty solvent detergents shall comply with SANS 1344:2009 Medium duty solvent detergent. It shall be used in cases where surfaces, walls and floors are soiled with oil, grease or similar soils.

A biological detergent may be used as an alternative where surfaces are soiled with oil, grease or similar soils. The biological detergent shall have an EU ECO-LABEL accreditation and shall be endorsed by Indalo Yethu (South Africa's official environmental campaign)

CJ 04.04.12 Other

Brooms, dusters and muslin cloths shall be seen as consumables.

The Contractor shall furthermore be responsible for the supply of batteries for all battery operated equipment, e.g. the urinal sanitizer and the air freshener dozer.

CJ 04.05 SOLID WASTE MANAGEMENT

All solid waste that is generated as a result of site keeping and cleaning shall be managed in accordance with specification CG Solid Waste.

CJ 05 MEASUREMENT AND PAYMENT

CJ.05.01 HAND DRYERS

Unit
No

The tendered rate shall include full compensation for the supply, delivery, labour, installation and commissioning of the unit. The unit shall be installed in accordance with the manufacturer's instructions.

CJ.05.02 AIR FRESHENER DOSERS

Unit
No

The tendered rate shall include full compensation for the supply, delivery, labour, installation and commissioning of the unit. The unit shall be installed in accordance with the manufacturer's instructions.

CJ.05.03 TOILET PAPER DISPENSING UNITS

Unit
No

The tendered rate shall include full compensation for the supply, delivery, labour, installation and commissioning of the unit. The unit shall be installed in accordance with the manufacturer's instructions.

CJ.05.04 SHE BINS

Unit
No

The tendered rate shall include full compensation for the supply, delivery, labour, installation and commissioning of the unit. The unit shall be installed in accordance with the manufacturer's instructions.

CJ.05.05 HAND SOAP DISPENSER

Unit
No

The tendered rate shall include full compensation for the supply, delivery, labour, installation and commissioning of the unit. The unit shall be installed in accordance with the manufacturer's instructions.

CJ.05.06 URINAL SANITIZER

Unit
No

The tendered rate shall include full compensation for the supply, delivery, labour and installation and commissioning of the urinal sanitizer. The unit shall be installed in accordance with the manufacturer's instructions.

CJ.05.07

PAPER TOWEL DISPENSER

Unit
No

The tendered rate shall include full compensation for the supply, delivery, labour, installation and commissioning of the unit. The unit shall be installed in accordance with the manufacturer's instructions.

CJ.05.08

WALL BIN

Unit
No

The tendered rate shall include full compensation for the supply, delivery, labour, installation and commissioning of the unit. The unit shall be installed in accordance with the manufacturer's instructions.

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TECHNICAL SPECIFICATION

HE EXTERIOR LIGHTING SYSTEMS

CONTENTS

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HE 02	STANDARD SPECIFICATIONS, REGULATIONS, CODES AND ADDITIONAL SPECIFICATIONS
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HE 04	TEST AND INSPECTION FOLLOWING COMPLETION OF REPAIR WORK
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HE 09	AREA LIGHTING: TECHNICAL DETAILS
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HE 12	MAINTENANCE OF EXTERIOR LIGHTING SYSTEMS AND DISTRIBUTION KIOSKS

HE 01 SCOPE

HE 01.01 This specification comprises all aspects regarding the maintenance of external lighting systems. External lighting comprises:

- i) Area lighting
- ii) Security lighting along perimeter fences
- iii) Street lighting

(l) **HE 01.02** This specification shall form an integral part of the maintenance and servicing contract document and shall be read in conjunction with Part C, the Additional Specifications included with this document.

HE 02 STANDARD SPECIFICATIONS, REGULATIONS AND CODES

HE 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.

HE 02.02 SANS Specifications

02.02.01	SANS 10400	National Building Regulation
02.02.02	SANS 10142	Wiring code
02.02.03	SANS 10225	Lighting masts
02.02.04	SANS 1277	Read lighting luminaires
02.02.05	SANS 1088	Spigot entries
02.02.06	SANS 1749	Glass polyester poles
02.02.07	SANS 1250	Capacitors, ballasts & lamps
02.02.08	SANS 1279	Floodlight luminaires
02.02.09	SANS 1777	Daylight switches
02.02.10	SANS 763	Galvanised coatings
02.02.11	SANS 1266	Discharge lamps
02.02.12	ARP 035	Streetlighting maintenance

HE 02.03 DEPARTMENT OF PUBLIC WORKS SPECIFICATION PW 774

HE 02.04 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.

HE 02.05 MANUFACTURER'S SPECIFICATIONS AND INSTALLATION INSTRUCTIONS

HE 02.06 Additional requirements

Equipment and material supplied and installed shall be new and unused.
Luminaires and control gear 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, luminaires, lighting poles and high masts.

HE 03 OPERATING AND MAINTENANCE MANUALS

HE 03.01 The Contractor shall be responsible for the compilation of a complete set of Operating-and-Maintenance manuals.

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

All information shall be recorded and reproduced in electronic format as well as supplying the Engineer with seven sets of hard copies.

HE 03.02 Over and above what is specified in the Additional Specification – SB Operating and Maintenance manuals, the Operating and Maintenance Manual to be compiled shall be structured and shall at least include the following:

03.02.01 Description of Installation

Complete system description of the lighting system. This shall be done for each lighting installation individually. The system description shall contain detailed information regarding the supply configuration (Distribution board, cabling, distribution kiosks, pole mounted distribution board), the switching arrangement (timers, photocells, override facilities) and the lighting (luminaire detail, lamp detail) as well as the earthing and lightning protection arrangement.

03.02.02 Commissioning Data

Complete commissioning, test and inspection data of lighting system.

This shall be done for each lighting installation individually. The commissioning data will comprise start-up and running current measurements at each termination point e.g. distribution board, kiosk and mast. Full data on lamps fitted with installation dates.

03.02.03 Operating data

- a) Safety precautions to be implemented.
- b) Operation of lighting systems; automatic, manual and bypass switching.

03.02.04 Maintenance instructions

- a) Projected frequency of lamp replacement per lighting system.
- b) Procedure to verify operation of photocell – controlled circuits.
- c) Procedure to verify operation of timer – controlled circuits.
- d) Trouble shooting diagram.

- e) Luminaire details, including manufacturers brochures / pamphlets, order number, list of components and lamp specification.
- f) Schedule of serviceable components per lighting system. These schedules shall include lamps, starters, ignitors, ballasts, lenses, etc.

HE 04 TESTS AND INSPECTIONS PRIOR TO PRACTICAL COMPLETION OF REPAIR WORK

HE 04.01 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:

- 04.01.01 Phase voltages
- 04.01.02 Current per phase
- 04.01.03 Illumination levels in lux
- 04.01.04 Insulation testing at 500V
- 04.01.05 Earthing resistance testing by means of wheatstone bridge instrument

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.

HE 05 LOGGING AND RECORDING PROCEDURES

HE 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.

HE 05.02 The logbook shall be stored in a safe place inside the prison maintenance supervisor's office 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:

- 05.02.01 Monthly lamp inspection and maintenance actions.
- 05.02.02 Bi-annual inspection and testing of lighting systems.
- (m) 05.02.03 Annual earthing test report.
- 05.02.04 Breakdown / call out reports.

HE 06 QUALITY ASSURANCE SYSTEM

HE 06.01 Following formal approval of his Quality Assurance system by the Engineer, the Contractor shall implement the approved QA system.

HE 06.02 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.

HE 07 RE-COMMISSIONING OF INSTALLATION

HE 07.01 On practical completion of the repair work and lamp replacement, the lighting installations shall be put into operation.

HE 07.02 Lighting installations shall be energised for a minimum continuous period of 96 hours immediately prior to the Engineer's Practical Completion inspection to verify lamp stability and reliability of power reticulation

HE 08 REPAIR WORK TO EXTERIOR LIGHTING INSTALLATIONS

HE 08.01 The various lighting systems shall be repaired as part of installation H during the first phase of the repair and maintenance contract

- HE 08.02** The scope of the repair work shall include, but shall not be limited to the activities listed below.
- HE 08.03** The Contractor shall record the repair actions in tabular format before the Contractor's responsibility for maintenance commences.
- HE 08.04** Repair work shall be executed within the approved period for repairs.
- HE 08.05** New equipment and material shall be supplied with a written guarantee confirming a defects liability period of 12 months from date of practical completion. These guarantees shall be furnished in favour of the Department of Public Works.
- HE 08.06** The following measurement and payment items shall apply for repair work

<u>Item</u>	<u>Unit</u>
-------------	-------------

- | | | |
|--------------------|---------------------------------------------------------------------------------------------------------|----------------------|
| HE 08.06(a) | <u>Excavate in all materials for trenches, backfill, compact and dispose of surplus material</u> | m³ |
|--------------------|---------------------------------------------------------------------------------------------------------|----------------------|

This rate shall apply to all the excavations.

The unit of measurement shall be the cubic metre of material excavated in trenches, classified according to the depth and width specified listed. The width classification shall be in accordance with the authorised dimensions and the depth classification in accordance with the total depth of the trench and not with the depth range in which the material is situated before excavation. The depth of excavation shall be measured to the underside of the bedding.

The tendered rate shall include full compensation for clearing and grubbing the trench areas and the temporary removal of improvements from the line of the trench, for excavating the trench, preparing the bottom of the trench, separating material unsuitable for backfill, keeping the excavations safe, dealing with any surface or subsurface water, measuring, classification and keeping of all records and for separating topsoil and selected backfill material where necessary.

The rate shall furthermore cover the costs of installing the 150mm sand bed and 200mm sand cover, backfilling, compacting and disposing of the surplus material.

<u>Item</u>	<u>Unit</u>
-------------	-------------

- | | | |
|--------------------|---------------------------------------------------------------------------|----------------------|
| HE 08.06(b) | <u>Extra over item HE 08.06(a) for excavating in hard material</u> | m³ |
|--------------------|---------------------------------------------------------------------------|----------------------|

The unit of measurement shall be the cubic metre of material excavated and classified as hard, in accordance with the classification set out hereunder.

The tendered rate shall be paid over and above the rate tendered for excavation in respect of items HE 08.06(a) in full compensation for the additional cost of excavating in hard material instead of soft.

The tendered rate shall include full compensation for any overbreak as well as the additional backfilling required, reinstating the trench bottom, and for any other incidentals resulting from overbreak.

The materials excavated shall be classified as follows for payment purposes:
Hard material:

Material which cannot be excavated efficiently except with the use of pneumatic tools, blasting or wedging and splitting, and shall include boulders exceeding 0,15 m³ in volume.

Soft material:
All material not classified as hard material.

Notwithstanding the above classification, all material excavated from previously constructed fills, embankments, pavement layers and from above existing services shall be classified as soft material.

The decision of the Engineer as to the classification of the material shall be final and binding and any objection as to the classification shall be made before the excavation has been backfilled.

Item

Unit

HE 08.06(c) Extra over item 3.10.1.1 for excavating by hand in all materials

m³

The unit of measurement shall be the cubic metre of trench material excavated by means of hand tools as instructed or authorised in writing by the Engineer where the use of conventional excavating equipment is either impractical or likely to cause damage to services, trees or property or where the electrical Contractor has to excavate by hand where he cannot excavate by machine.

The volumes of the trench excavation will be computed from the length and the depth to the bottom of the specified bedding layer and the minimum base widths specified in the drawings. The rate shall cover the cost of complying with the safety and protection requirements specified except where particular items are scheduled to cover particular costs for the excavation.

The tendered rate shall be paid extra over the rates tendered for item HE09.06(a).1 in full compensation for the additional expense of excavating by means of hand labour instead of conventional trenching equipment.

Item

Unit

HE 08.06(d) Extra over item HD09.06(a) for using backfill material obtained from sources provided by the Contractor

m³

The unit of measurement shall be the cubic metre of imported backfill material.

Item HD09.06(d) above will not be measured for payment unless importation has been ordered in writing. The volume will be computed from the trench width and the depth from ground level to the top of the sand bed cover as shown on the tender drawings. The rate for material from designated borrow pits shall cover the cost of excavation and selection of suitable material, the moving of the material to the backfilling site, and the disposal of the material that becomes surplus as a result of the importation, all within 0,5 km.

The tendered rate for item HE09.06(d) paid extra over item HE09.06(a) shall cover the cost of the acquisition of the material and of the disposal of the surplus material resulting from the importation together with all the costs of transporting the material to the site regardless of distance.

Item

Unit

HE 08.06(e) Supply and Install Cable Sleeves

m

The unit of measurement shall be the linear length in meter of cable sleeves supplied and installed.

The tendered rate shall include full compensation for the supply, delivery, handling and installing the cable sleeves including all the required couplings, steel draw wires and plugs.

Item

Unit

HE 08.06(f)	<u>Supply and Install Plastic Warning Tape</u>	m
	The unit of measurement shall be the length in meter of plastic warning tape supplied and installed.	
	The tendered rate shall include full compensation for the supplying, handling and laying the plastic warning tape.	
	<u>Item</u>	<u>Unit</u>
HE 08.06(g)	<u>Supply and delivery of low-voltage cable</u>	m
	The unit of measurement shall be the length of low-voltage cable supplied.	
	The tendered rate shall include full compensation for the manufacture, supply and delivery of the specified cable to the site.	
	Separate items shall be scheduled under this payment item for each size and type of cable required.	
	<u>Item</u>	<u>Unit</u>
HE 08.06(h)	<u>Lay LV-cable</u>	m
	The unit of measurement shall be the linear length in meter of LV-cable installed.	
	The tendered rate shall include full compensation for the handling, inspecting, laying, cutting and testing the cable. Cables shall be measured linearly over all lengths laid. Separate items shall be scheduled for each size and each type of cable laid.	
	<u>Item</u>	<u>Unit</u>
HE 08.06 (i)	<u>Termination of LV-cables</u>	No
	The unit of measurement shall be the number of LV-cable terminations.	
	The tendered rate shall include full compensation for providing the cable glands, shrouds and lugs, the cost of handling, fitting and cutting the cable. Separate items shall be scheduled for each size and type of cable.	
	<u>Item</u>	<u>Unit</u>
HE 08.06(j)	<u>Supply bare copper earth conductor</u>	m
	The unit of measurement shall be the length in meter of bare copper earth conductor supplied.	
	The tendered rate shall include full compensation for procuring, furnishing and laying the specified earth continuity conductor.	
	<u>Item</u>	<u>Unit</u>
HE 08.06(k)	<u>Installation of bare copper earth conductor</u>	m
	The unit of measurement shall be the length in meter of bare copper earth conductor installed.	
	The tendered rate shall include full compensation for procuring, furnishing and laying the specified earth continuity conductor.	
	<u>Item</u>	<u>Unit</u>

HE 08.06(l)	<u>Terminate and connect bare copper earth conductor</u>	No
	The unit of measurement shall be the number of bare copper earth conductors terminated and connected.	
	The tendered rate shall include full compensation for supplying all the material required to terminate and connect the bare copper earth conductors and the connecting thereof to the earth bars.	
	<u>Item</u>	<u>Unit</u>
HE 08.06(m)	<u>Jointing of low-voltage cable</u>	No
	The unit of measurement shall be the number of LV-cables joints.	
	The tendered rate shall include full compensation for the cost of providing the kits, the cost of cutting the cable, handling and fitting the kits and the cost of testing the joints.	
	<u>Item</u>	<u>Unit</u>
HE 08.06(n)	<u>Re-lamp luminaire</u>	No
	The unit of measurement shall be the number of luminaire lamps replaced.	
	The tendered rate shall include full compensation for the supply and installation of the lamp according to the manufacturer's instructions.	
	Separate items shall be scheduled for each type of lamp.	
	<u>Item</u>	<u>Unit</u>
HE 08.06(o)	<u>Supply and installation of internal luminaire components</u>	No
	The unit of measurement shall be the number of internal luminaire components replaced.	
	The tendered rate shall include full compensation for the supply and installation of the components according to the manufacturer's instructions.	
	Separate items shall be scheduled for each component.	
	<u>Item</u>	<u>Unit</u>
HE 08.06(p)	<u>Internal wiring of luminaire</u>	No
	The unit of measurement shall be the number of luminaires rewired with silicone insulated wiring.	
	The tendered rate shall include full compensation for the supply and wiring of a luminaire with silicone insulated wiring where the wiring are specified separately.	
	<u>Item</u>	<u>Unit</u>
HE 08.06(q)	<u>Supply and install circuit breakers</u>	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 circuit breakers where the circuit breakers are specified separately.	

	<u>Item</u>	<u>Unit</u>
HE 08.06(r)	<u>Supply and install isolators</u>	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 isolators where the isolators are specified separately.	
	<u>Item</u>	<u>Unit</u>
HE 08.06(s)	<u>Supply and install contactors</u>	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 contactors where the contactors are specified separately.	
	<u>Item</u>	<u>Unit</u>
HE 08.06(t)	<u>Supply and install of low tension fuses</u>	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 fuses where the fuses are specified separately.	
	<u>Item</u>	<u>Unit</u>
HE 08.06(u)	<u>Supply and install photocell (plug-in type)</u>	No
	The unit of measurement shall be the number of photocells supplied and installed.	
	The tendered rate shall include full compensation for the supply and installing of the photocells where the photocells are specified separately.	
	<u>Item</u>	<u>Unit</u>
HE 08.06(v)	<u>Supply and install QAT-R type electronic timer</u>	No
	The unit of measurement shall be the number of timers supplied and installed.	
	The tendered rate shall include full compensation for the supply and installing of the timers where the timers are specified separately.	
	<u>Item</u>	<u>Unit</u>
HE 08.06(w)	<u>Supply and install 0-30A HRC fuses</u>	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 installing of the fuses where the circuit breakers are specified separately.	
	<u>Item</u>	<u>Unit</u>
HE 08.06(x)	<u>Supply and install end connectors and insulating sleeves</u>	No

The unit of measurement shall be the number of end connectors and insulating sleeves supplied and installed.

The tendered rate shall include full compensation for the supply and installation of the end connectors at the light pole or where cables forms a looping system.

Item

Unit

HE 08.06 (y) Replace pole

(n) The unit of measure shall be the number of poles replaced.

The tendered rate shall include full compensation for the removal of all equipment from the existing pole, removal of the existing pole from site, ordering, supply and installation of the pole in the position specified.

The contractor shall install all existing equipment onto the new pole

Item

Unit

HE 08.06 (z) Replace Luminaire diffuser

(o) The unit of measure shall be the number of luminaire diffusers replaced.

The tendered rate shall include full compensation for the removal of the diffuser from the existing luminaire, ordering, supply and installation of the new diffuser as specified according to manufactures instructions.

Item

Unit

HE 08.06 (aa) Replace pole mounted brackets

(p) The unit of measure shall be the number of pole brackets replaced.

The tendered rate shall include full compensation for the ordering, supply and installation of the pole bracket including all fixing accessories as specified according to manufactures instructions.

(q) The tendered rate shall further include for the removal of all old equipment from the pole and the supply and installation of the new equipment onto the pole bracket including the connection of the equipment.

(r)

Item Unit

HE 08.06 (ab) Replace pole cover

(s) The unit of measure shall be the number of pole covers replaced.

The tendered rate shall include full compensation for the removal of the pole cover from the existing pole, ordering, supply and installation of the new pole cover as specified according to manufactures instructions.

Item

Unit

HE 08.06(ac) Junction boxes including pole mount brackets.

No.

The unit of measure shall be the number of junction boxes supplied and installed.

The tendered rate shall include full compensation for the supply and installation of junction boxes brackets and strapping. The junction box must be fitted with a neutral bar earth bar, din

terminal rails and CBI circuit breaker clips to accommodate the maximum amount of terminals and circuit breakers.

Item

Unit

HE 08.06(ad) Remove rust and paint kiosks

The unit of measurement shall be the total number of kiosks painted.
The tendered rate shall include full compensation for the removal of rust with a anti corrosion agent and the repainting of the whole kiosk.

Item

Unit

HE 08.06(ae) Label kiosks

No.

The unit of measure shall be the total number of kiosks labelled.

The tendered rate shall include full compensation for the labelling of kiosks circuit breakers, cable and the warning notification to be installed.

Item

Unit

HE 08.06(af) Supply and install padlocks

No.

The unit of measurement shall be the number of padlocks installed.

The tendered rate shall include full compensation for the ordering, supply, engraving and installation of the padlocks, locking devices and seals.

Lock shall be "keyed alike".

Item

Unit

HE 08.06(ag) Replace distribution meter kiosks.

No.

The unit of measurement shall be the number of distribution kiosks replaced.

The tendered rates shall include full compensation for the removal, the ordering, supply and installation of the new 6/4 way meter boxes complete with watt hour meters, circuit breakers, gland plate, labelling and concrete foot strip as specified.

Consumer distribution kiosks

(a) General

The kiosks shall be of adequate size to accommodate the number of outgoing consumer circuits specified.

The kiosks shall have two sections, namely:

- (i) one section containing all incoming and outgoing switchgear and cables, and
- (ii) one section containing the consumer meters and circuit breakers.

(b) Fabrication

The kiosks shall be fabricated from 3CR12 stainless steel of minimum thickness 2,5 mm and shall be mounted on a channel iron steel base.

A metal frame work, manufactured from solid angle iron, channel iron, or 2,5 mm 3CR12 folded sheet steel shall be mounted on the base of the kiosk. The kiosk shell shall be completely independent from the frame and equipment so that the kiosk shell can be removed and replaced

without disconnecting any equipment. The kiosk shall be bolted down onto the base by means of four M16 high tensile bolts which shall be accessible from the inside of the kiosk only.

The kiosks shall be weatherproof, vermin and insect-proof and proved against tampering. To prevent the ingress of water onto live equipment, the door entry surrounds shall have a channel shape, at least 12 mm deep, to accommodate the door edge. A rubber or neoprene closer strip shall be so fitted to the edges of each door as to provide a seal to keep rain water and dust out of the kiosk.

The kiosk shall have a pitched roof that slopes downwards at the front and at the back with an overhang of at least 75 mm all round.

The kiosks shall be fitted with a door in the front and at the back of the kiosk. The maximum width per door shall be 600 mm. The doors shall provide free access to the equipment and shall provide a full view of all meters. The doors shall have well returning edges to fit into the channel of the door entry surrounds. Each door shall have three robust solid brass hinges each of length at least 100 mm. The hinges shall be completely concealed. Doors shall be fitted with lever locks. The locking mechanism shall facilitate three point latching at the top, side and bottom of the doors. In the case of double doors the first door shall be locked with two slides on the inside onto the kiosk shell. The second door shall close over a lip on the first one. Nylon door restraints shall be provided. The fixing points of the restraints at the door and the canopy shall be reinforced. The doors shall be earthed bonded to the frame by means of a copper braided strap, tooth washers, bolts and nuts.

Ventilation louvres with approximate size 225 x 150 mm shall be provided on both sides of the kiosk. Each ventilation louver shall be covered on the inside with perforated plates with 2,5 mm holes so that

- it is not possible to push a steel wire through it into the interior of the kiosk, and
- it prevents vermin from entering into the kiosk.

A mounting panel shall be positioned in the centre of each kiosk, fixed to the frame work, for the mounting of the specified equipment.

(c) Mounting panel

The mounting panel shall consist of a minimum 3 mm thick mild steel plate.

The one section of the panel shall be equipped with copper busbars mounted on porcelain or similar insulators and of sufficient length to accommodate three 12 mm brass bolts for the connection of distribution cables and six consumer meter connections per phase. The busbars shall be tinned after the drilling of holes. The busbars shall be able to carry 250 Ampere at a current density of not more than 1,5 A/mm². Each busbar shall be marked red, yellow and blue with black for the neutral bar. The busbars shall be able to withstand the thermal and dynamic forces resulting from short circuits without deformation taking place or parts breaking.

The specified consumer equipment shall be installed in the second section. The mounting panel and equipment shall be enclosed by a machine punched removable front panel through which the operating handles of the equipment and the face plates of the meters protrude.

(d) Equipment installed in kiosks

The equipment to be installed in the kiosks shall be as specified in the detail specification.

(e) Wiring of kiosks

The internal wiring in the kiosks shall be done with PVC insulated copper conductors. The wiring shall be done in neat horizontal and vertical columns. Each consumer circuit shall be wired from the phase busbars to the circuit breaker and from the circuit breaker to the meter.

Connections to busbars and terminals shall be done by means of cable lugs crimped in an approved manner to the conductor ends. Connections to the busbars shall be made by means of cadmium plated high tensile steel bolts and nuts with locking washers.

(f) Earthing

A 25 mm x 6 mm long tinned copper earth bar shall be installed at the bottom of the kiosk.

10 mm diameter holes shall be drilled through the earth bar to provide for the distribution cable and service cable earth conductors. All bolts used for the fixing of the earth conductors shall be cadmium plated and only one earth conductor shall be connected per bolt.

The metal work of the kiosk shall be earthed to the earth bar by means of a 70 mm² stranded copper conductor. An earth stud shall be provided on the kiosk housing for this purpose.

(g) Cable gland plate

The cables shall be terminated on a removable galvanised gland plate of suitable dimension and strength. The gland plate shall cover the full length of the kiosk.

The gland plate shall be at least 300 mm below the nearest terminal of switchgear allowing sufficient space for bending the cable ends. Sufficient space shall be provided underneath the gland plate to allow for the installation of the cables without removing the gland plate. The gland plate shall be earthed to the earthbar by means of a 70 mm² stranded copper earth conductor.

(h) Terminal blocks

A terminal block type suitable for the termination of 16 mm² stranded copper conductors shall be provided. Terminals shall be of the screw type and a terminal shall be provided for each service connection cable.

(i) Labels

The kiosks shall be supplied with the following labels:

- (i) An aluminium label with 40 mm high letters and numeral indicating the kiosk number.
- (ii) Engraved trafolite labels with 6 mm high numerals under each circuit breaker, meter, and terminal on the terminal block indicating the consumer stand number.

The labels shall have a white background and black letters. The 40 mm labels shall be fixed by means of rivets and the 6 mm high labels shall be inserted in 25 mm wide aluminium label holder mounted at the bottom of the relevant equipment.

(i) Danger signs

The requirements of Regulation C-52 of the Machinery and Occupational Safety Act No 6 of 1983 shall be complied with. All doors shall be fitted with a 150 x 100 mm Danger/Gevaar/Ingozi signs.

(j) Painting and finishing

(i) Post-weld cleaning and passivation of 3CR12

Post-weld cleaning shall be undertaken on all welded areas. One of the following cleaning methods may be used to remove all surface discolouration and scale from welded areas.

- (1) Wire brushing : Where it is possible to remove the discolouration and detritus from weld areas by brushing, stainless steel wire brushes, that have not been used on other material other than 3CR12, may be used.
- (2) Grinding : Dedicated grinding wheels and discs based on alumina shall be used for the dressing of welds. The use of silicon carbide wheels and discs shall not be used.
- (3) Abrasive blast cleaning : The abrasive used shall be washed silica sand or alumina totally free of metallic iron, iron oxides or chlorides.

(ii) Chemical cleaning (pickling)

The pickling of 3CR12 shall be carried out using formulations based on nitric (HNO₃) and hydrofluoric (HF) acid. Formulations based on hydrochloric acids shall not be used. Acids used shall conform to commercial purity standards. Where proprietary pickling formulations are used, the manufacturer's directions concerning the application procedures shall be strictly adhered to.

(iii) Passivation

The passivation of the 3CR12 shall be carried out as soon as possible after the post-weld cleaning has taken place. A solution made up of nitric acid shall be used for the passivation of the 3CR12. The solution shall be generously applied to the steel by brush, cloth, spray or dipping. Care shall be taken that the solution does not dry on the steel surface. The steel shall be thoroughly washed with clean cold water to remove all traces of the acid use.

(iv) General

The entire process of cleaning, pickling, passivation and neutralization shall be completed in one working day.

Tenderers shall submit full details of the post weld process their suppliers intend to use.

(v) Painting

All interior metal work shall be thoroughly derusted and degreased and shall be prepared for painting in accordance with SANS 066.

Immediately after cleaning a zinc chromate red oxide primer with a dry film thickness of 25 micrometre shall be applied in accordance with SANS 679. An intermediate enamel coat shall be applied to the primed surface and thereafter the finishing coat of white enamel paint shall be applied to the interior and "light stone", colour C37 SANS 1091 to the exterior.

The bases and under sides must be treated in an approved manner and finished with two coats epoxy-tar paint.

(k) Drawings and information

Tenderers shall submit full details of the cubicles offered with the following drawings with the tender

- a drawing indicating all dimensions of the kiosks
- a drawing indicating the dimensions of the plinth with fixing arrangements
- a drawing indicating the general internal equipment layout of the kiosks.

The successful tenderer shall, before the manufacturing of the kiosks commences, submit the final drawings to the Engineer for approval.

A schematic wiring diagram of the kiosk, as wired and colour coded, shall be submitted at the completion of the contract.

(I) **Inspection**

The successful tenderer shall allow the representative of the Engineer access to the manufacturer's works at all reasonable times to inspect the progress of the work and to witness all tests

Item

Unit

HE 08.06(ah) Replace door hinges on meter and distribution kiosks.

No.

The tendered rate shall include full compensation for the removal of damaged hinges, the supply, delivery and installation of new hinges.

Item

Unit

HE 08.06(ai) Supply and install handles.

No.

(Perano type lockable turn catch door handle (heavy duty)

The unit of measure shall be the total number of handles installed.

The tendered rate shall include full compensation for the removal of the old handle and ordering, supply and installation of a lockable turn catch handle.

HE 09 AREA LIGHTING : TECHNICAL DETAILS

HE 09.01 Installation description

This section describes the electrical distribution network that will be repaired and maintained in terms of this contract.

Luminaries are suspended on fibreglass poles of various lengths. Area lights are controlled by means of photocells and manual on/off switches.

HE 09.02 Scope of repair work

Open each pole cover and inspect fuse or circuit breaker, tray and shield plate as well as earthing connection. Check and replace cover seal if required.

Service each luminaire, open control gear enclosures and treat for moisture ingress and corrosion. Wash luminaires with detergent and clean lenses. Check and replace neoprene seals.

Re-lamp luminaires.

Replace luminaires: Remove existing damaged luminaires, supply and install similar and approved luminaires complete with lamps and control gear, if applicable.

Open upstream distribution board. Check and fasten cable terminations, fit labelling and blank face-plate covers. Check locking mechanism and fit padlock.

Open distribution kiosk. Clean inside and add termite and rodent poison. Fit circuit labelling. Check locking mechanism and fit padlock.

Service luminaries by washing with detergent and re-lamping where necessary. Clean lenses. Check condition of seals and glands and test for earth continuity.

Check consistency of aiming angles and tighten mounting bracket bolts

HE 09.03 Repair work: Measurement and payment

<u>Item</u>	<u>Unit</u>
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(a) <u>Relamp luminaire</u>	No
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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 lamp according to the manufacturer's instructions.

<u>Item</u>	<u>Unit</u>
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(b) <u>Service luminaire</u>	No
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The unit of measurement shall be the number of luminaires opened and serviced.

The tendered rate shall include full compensation for the servicing of the luminaire, including washing, corrosion protection, checking of seals and glands, cleaning of the lenses, tightening of stirrup bracket bolts and the checking of earthing continuity, connections and aiming angle.

<u>Item</u>	<u>Unit</u>
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(c) <u>Service light distribution kiosk or DB</u>	No
----------------------------------------------------------	----

The unit of measurement shall be the number of distribution boards or kiosks serviced.

The tendered rate shall include full compensation for the cleaning and opening of kiosk or DB, vermin protection, checking of MCB's, checking and tightening of wire terminations, fitting of labels and blank covers. The contractor is to submit a report on the general condition of the kiosk or distribution boards (damaged, rust marks, etc.)

<u>Item</u>	<u>Unit</u>
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(d) <u>Supply and install padlocks</u>	No
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The unit of measurement shall be the number of 75mm padlocks installed.

The tendered rate shall include full compensation for the ordering, supply, engraving and installation of the padlocks, locking devices and seals. Locks shall be "key alike".

<u>Item</u>	<u>Unit</u>
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(e) <u>Service area light pole</u>	No
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1. The unit of measurement shall be number of area light poles opened and serviced.

The tendered rate shall include full compensation for the opening of pole cover, visual inspections, tightening all connections and straightening of pole

<u>Item</u>	<u>Unit</u>
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(f) <u>Replace luminaire</u>	No
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The unit of measurement shall be number of luminaires replaced.

<u>Item</u>	<u>Unit</u>
(q) Replace pole	No

The contractor shall install all existing equipment onto the new pole

<u>Item</u>	<u>Unit</u>
(h) Supply and install 25m High Scissor Light Mast	No

The unit of measurement shall be the number of 25m high scissor light mast hot dip galvanised to SANS 121 ISO 1461 specification supplied and installed.

The tendered rate shall include full compensation for the manufacturing, delivery, assemble and erection of the 25m high scissor light mast complete with brackets to carry 9 x 400W HPS Floodlight luminaries, cabling, ring, wiring of luminaries, electrical distribution board and splitter box.

The tendered rate shall further include full compensation for grouting the gap between the mast base plate and the foundation with a Prostruct 531 mixture.

The earthing, excavations and casting of foundation of the mast will be measured elsewhere.

HIGH MAST SPECIFICATION

1. Construction

The masts shall be constructed from conical sections which, when assembled, will form a tapered column of circular cross section. There shall be no fillet welds of the overlaps. The sections shall be joined by friction fit only.

The masts shall be of lightweight construction and a base plate shall be welded to the bottom end of the lowest section suitably drilled for foundation bolts.

All welding to be subject to S.A.B.S. Spec 044 Part 3 Grade B and shall be carried out by S.A.B.S. coded welders only. Proof that all welders have been tested by the S.A.B.S. must be submitted on request. Inspection and acceptance certificates shall be furnished on request.

The steel used in the manufacture of the mast shall have an ultimate tensile strength of between 450 and 620 MPa and identical to SABS 1431 grade 300WA steel.

Proof must be supplied that the manufacturer is ISO 9001 accredited.

2. Dimensions

The masts offered shall give an overall floodlight mounting height of 25 m. The cross-section and wall thickness of the mast is determined on the basis of the working loads.

3. Working Loads

The masts shall be designed in accordance with the S.A.B.S. 0225 Code of Practice for the design and construction of lighting masts. The following site factors shall be considered:

Design wind speed	=	40m/s
Class of structure	=	B
Category of terrain	=	2
Altitude of site	=	1200 m

The mast shall carry at its top 9 x 400W HPS Floodlights evenly around its circumference.

Data on wind induced oscillations and the dynamic behaviour of the mast shall be submitted.

4. Access Opening

An access door adequately protected against the weather shall be provided in the mast, with the bottom lintel 600mm above the base plate. The door shall be adequately protected against vandalism and secured by three screws requiring a special opening tool.

A doorframe shall reinforce the opening in the mast.

The mounting strips welded opposite the door opening shall be drilled for the mounting of a control board. Earth terminals, as well as a support bar for the incoming supply cables, shall be provided below the door opening.

5. Corrosion Protection

All parts of the mast and raising and lowering device, not specified as manufactured from stainless steel, shall be hot dip galvanised to SAB Specification No. 763/1977 and inspection certificates provided if required.

No welding, drilling, punching, bending or removal of burrs shall be carried out after galvanising.

6. Electrical Connection to the Luminaires

A fully enclosed distribution board shall be provided for each mast, containing:

- 1 x 3 pole isolator (main switch)
- 3 x single pole MCB's (lights)
- 1 x single phase switched socket outlet for the use of a power tool
- 1 x two pole earth leakage unit protecting the single phase outlet
- 1 x 7pinCEEsocket
- 1 x adequately rated contactor
- 1 x single pole MCB acting as by-pass switch
- 1 x single pole MCB protecting the contactor

All circuit breakers and isolators shall have a rupturing capacity of 5 kA and shall bear the mark of the S.A.B.S. and shall be accessible through cut-outs in the cover without having to remove the cover.

All equipment shall be clearly marked with engraved labels. No stick-on embossed tape shall be used.

The distribution board shall be fully wired and ready for connection to the incoming supply cables.

7. FOUNDATIONS

Each mast shall be supplied with foundation bolts and templates. The bolts shall be hot dip galvanised over their entire length to S.A.B.S. Specification No. 763/1977. Two galvanised nuts, two washers and one spring washer shall be supplied for each bolt. The number of foundation bolts shall be determined according to the design of I .3 above. Calculations shall be submitted upon request.

A foundation plan, adequately designed for the conditions as per I .3 of this specification, and based on a soil bearing capacity of 150 kPa, giving details of the reinforcing required shall be submitted. Soil pressure and overturning safety factor shall be stated.

All reinforcing and foundation bolts shall have a minimum of 100mm concrete cover. The 28 days cube strength of the concrete shall be 25 MPa.

All foundations shall have a circular flat base from which a square plinth shall rise to above the surrounding ground level.

One or two PVC, Class B cable sleeves shall be provided from the centre of the top of the foundation plinth, through the concrete to a point below ground level on the side of the plinth.

After casting of the foundation, the slab shall be covered by earth, properly compacted. The area around the plinth shall be brought to the original level and shall be left neat and tidy.

8. LUMINAIRES

- The floodlight luminaire shall be beam type 400W HPS.
- The floodlight shall be suitable for HST 1000W lamp.
- The body of the luminaire shall be of die-cast aluminium with polyurethane finish.
- The reflector shall be high purity bright anodised aluminium and shall provide a narrow asymmetrical beam.
- The peak intensity shall not be less than 48000 lumens.
- The front glass shall be heat resistant armoured glass.
- The gaskets shall be silicone rubber.
- The fasteners shall be stainless steel.
- The luminaire control gear shall be housed in an integral weatherproof container.

HE 10 SECURITY FENCE LIGHTING: TECHNICAL DETAILS

HE 10.01 Installation description

This section describes the electrical distribution network that will be repaired and maintained in terms of this contract.

Luminaires are suspended on fibreglass poles. Lights are controlled by means of photocells and manual on/off switches.

HE 10.02 Scope of repair work

2. Open each pole cover and inspect fuse or circuit breaker, tray and shield plate as well as earthing connection. Check and replace cover seal if required. Wash luminaire and lens replace neoprene seal and re-lamp luminaires.

3.

4.

Replace luminaires: Remove existing damaged luminaires, supply and install similar and approved luminaires complete with lamps and control gear, if applicable. Check aiming angle and adjust if necessary.

Open upstream distribution board. Check and fasten cable terminations, fit labelling and blank face-plate covers. Check locking mechanism and fit padlock.

Open distribution kiosk. Clean inside and add termite and rodent poison. Fit circuit labelling. Check locking mechanism and fit padlock.

Open each distribution Kiosk, clean inside provide termite and rodent poison. Check earth bar and earth continuity. Check and fasten cable terminations, fit labelling and blank face-plate covers. Check locking mechanism and fit padlock. Check earth connection to electrode.

Service luminaires by washing with detergent and re-lamping where necessary. Clean lenses. Check condition of seals and glands and test for earth continuity.

HE 10.03

Repair work: Measurement and payment

<u>Item</u>	<u>Unit</u>
-------------	-------------

(a) <u>Service security light pole</u>	No
-----------------------------------------------	----

The unit of measurement shall be the number of security light poles opened and serviced.

The tendered rate shall include full compensation for the opening of pole box, visual inspections, corrosion protection, straightening of poles if necessary, treating of wooden poles with cresote and securing circuit breakers and terminations.

The contractor shall give a general report on the condition of the pole and equipment. The report should indicate if poles are rotten (wood poles), bent (steel poles), broken (wood, steel, concrete or fiberglass poles) or if the pole should be painted (steel). Strap all cable to pole.

<u>Item</u>	<u>Unit</u>
-------------	-------------

(b) <u>Re-lamp luminaire</u>	No
-------------------------------------	----

The unit of measurement shall be the number of security lamps replaced.

The tendered rate shall include full compensation for the supply and installation of the lamp according to the manufacturer's instructions.

<u>Item</u>	<u>Unit</u>
-------------	-------------

(c) <u>Service distribution kiosk</u>	No
----------------------------------------------	----

The unit of measurement shall be the number of distribution kiosks or boards opened and serviced.

The tendered rate shall include full compensation for the opening of kiosk or distribution board, vermin protection, cleaning of circuit breakers, earth testing, secure circuit breakers and terminations and fitting of blank covers. The contractor is to submit a report on the general condition of the kiosk or distribution board (damaged, rust marks, etc.)

<u>Item</u>	<u>Unit</u>
-------------	-------------

(d) <u>Replace luminaires</u>	No
--------------------------------------	----

The unit of measurement shall be the number of security floodlight luminaires replaced.

The tendered rate shall include full compensation for the supply and installation of the luminaire complete with the lamp and control gear according to the manufacturer's instructions.

<u>Item</u>	<u>Unit</u>
-------------	-------------

(e) <u>Service luminaire</u>	No
-------------------------------------	----

The unit of measure shall be the number of luminaires serviced.

The tendered rate shall include full compensation for the service of the luminaire, including washing, corrosion protection, checking of seals and glands, cleaning of lenses, tightening of brackets bolts, checking of earthing continuity, checking of aiming angle and adjust if necessary

HE 11 STREET LIGHTING: TECHNICAL DETAILS

HE 11.01 Installation description

This section describes the electrical distribution network that will be repaired and maintained in terms of this contract.

Luminaires are suspended on steel, wood, concrete and fibreglass poles of various lengths. Street lights are controlled by means of photocells and manual on/off switches.

HE 11.02 Scope of repair work.

Open distribution kiosk, check locks, clean inside, provide termite and rodent poison.

Open each mast cover and inspect fuse or circuit breaker, tray and shield plate as well as earthing connection. Check and replace cover seal if required. Wash luminaire, replace neoprene seal, clean lens and re-lamp luminaires if required. Replace luminaires: Remove existing damaged luminaires, supply and install similar and approved luminaires complete with lamps and control gear, if applicable. Assess aiming angle and adjust if necessary

HE 11.03 Repair work: Measurement and payment

<u>Item</u>	<u>Unit</u>
-------------	-------------

(a) <u>Service streetlight pole</u>	No
--------------------------------------------	----

The unit of measurement shall be the number of security light poles opened and serviced.

The tendered rate shall include full compensation for the opening of pole cover, visual inspections, straightening of poles if necessary and securing circuit breakers and terminations.

The contractor shall give a general report on the condition of the pole and equipment. The report should indicate if poles are rotten (wood poles), bent (steel poles), broken (wood, steel, concrete or fibreglass poles) or if the pole should be painted (steel). Strap all cable to pole.

<u>Item</u>	<u>Unit</u>
-------------	-------------

(b) **Re-lamp luminaire**

No

The unit of measurement shall be the number of street light lamps replaced.

The tendered rate shall include full compensation for the supply and installation of the lamp according to the manufacturer's instructions.

Item

Unit

(c) **Service street Luminaire**

No

The unit of measure shall be the number of luminaires serviced.

The tendered rate shall include full compensation for the service of the luminaire, including washing, corrosion protection, checking of seals and glands, cleaning of lenses, tightening of brackets bolts, checking of earthing continuity, checking of aiming angle and adjust if necessary

Item

Unit

(d) **Replace streetlight luminaire**

No

The unit of measurement shall be the number of streetlight luminaires replaced.

The tendered rate shall include full compensation for the supply and installation of the luminaire complete with the lamp and control gear as per manufacturer's instructions.

Item

Unit

(e) **Supply and install photocell bypass**

No

The unit of measure shall be the number of photocell bypasses installed.

The tendered rate shall include full compensation for the design supply and installation of the photocell bypass.

Item

Unit

(f) **Replace 125MV choke in control gear.**

No

The unit of measure shall be the number of chokes installed.

The tendered rate shall make full compensation for ordering, supply and installation of chokes.

Item

Unit

(g) **Replace connection to streetlight luminaire.**

No

The unit of measure shall be the number of connections replaced from the streetlight luminaire to the overhead line.

The tendered rate shall make full compensation for ordering, supply and connection of the luminaire to the overhead line with silicon cable or airduct and cable clamps on to the overhead line.

HE 12 MAINTENANCE OF THE INSTALLATION

HE 12.01 The various lighting systems shall be maintained in perfect working order following the initial repair work. The maintenance contract shall run for the balance of the 36-month contract period.

HE 12.02 The following maintenance actions will be required under this phase of the contract:

- 12.02.01 Routine preventative maintenance
- 12.02.02 Corrective maintenance
- 12.02.03 Breakdown maintenance

These actions are defined in the Additional Specification SA – General Maintenance.

HE 12.03 The maintenance schedules and frequency of maintenance activities shall be developed under the maintenance control plan which will be instituted by the Contractor. The Contractors responsibility in this regard is specified in the Additional Specification SA – General Maintenance.

5.

6. HE 12.04 The following shall be used as guidelines to ensure effective maintenance:

12.04.01 Scope of maintenance work on area lighting

- a) Monthly
 - i) Verify operation of switching element
 - ii) Check lamps
 - iii) Check mast door for weatherproof seal
 - iv) Check earth connection at footing, record value
- b) Annual
 - i) Service all luminaires
 - ii) Measure earth resistance of electrode
 - iii) Measure earth resistance of trench earth
 - v) Record values in record book

12.04.02 Scope of maintenance work on security lighting

- a) Monthly
 - i) Verify operation of switching element.
 - ii) Check lamps.
 - iii) Check that all pole covers are secure.
 - iv) Visually check distribution kiosk.
- b) Annual

Measure phase voltages and line currents in distribution kiosk or local distribution board. Record values in record book. Do vermin protection. Service all luminaires.

12.04.03 Scope of maintenance work on street lighting

- a) Monthly
 - i) Verify operation of switching element.

- ii) Check lamps.
- iii) Check that all pole covers are secure.
- iv) Visually check distribution kiosk.

b) Annual

Measure phase voltages and line currents in distribution kiosk. Record values in Record book. Do vermin protection. Service all luminaries and distribution kiosks.

HE.12.05 Maintenance shall include all repairs, replacing of components or materials, routine setting or any other actions necessary to ensure a perfect functional condition.

TECHNICAL SPECIFICATION

IG AUTOMATIC FIRE DETECTION SYSTEMS

CONTENTS

IG 01 SCOPE

- IG 02 STANDARD SPECIFICATIONS
- IG 03 DEFINITIONS
- IG 04 OPERATION AND MAINTENANCE MANUALS
- IG 05 DETAIL OF REPAIR WORK
- IG 06 MAINTENANCE
- IG 07 RECORD KEEPING AND LABELLING

IG 01 SCOPE

IG 01.01 This standard specification covers the repair and maintenance of the complete fire detection installation including the following (this list is not intended to be complete):

- ☐ Fire alarm panels and remote indicators.
- ☐ Battery chargers and batteries.
- ☐ Links to the fire brigade.
- ☐ All wiring, cables and antennas connected to the fire detection system.
- ☐ Detectors, break glass units and other initiating devices.
- ☐ Alarms, flashing beacons, warning lights and other notification devices.
- ☐ Gas control units, evacuation lights, sirens and associated devices.
- ☐ Door closers and hold open magnets controlled by the fire detection system. Door sequencers on these doors also forms part of the fire detection system.
- ☐ Door locks monitored by the fire detection system.
- ☐ Relays and other interface equipment.
- ☐ Wiring to interfaces such as telephone connections, modems, dialling units, optic fibre converters, etc.
- ☐ Warning signs, labels, blocked plans, drawings and manuals.

IG 01.02 The following does not form part of the scope of this technical standard:

- ☐ Fire and smoke dampers and their release mechanisms.
- ☐ Associated equipment forming part of another system e.g.
 - Fire relays in an air-conditioning control panel.
 - Detonators installed on gas cylinders.
 - Gas release solenoids forming part of the gas cylinders.
- ☐ SCADA, computers and other monitoring systems.
- ☐ Monitoring equipment at the fire brigade.
- ☐ Gas or other extinguishing systems.
- ☐ Modems, line drivers, optic fibre converters, etc. that forms part of a link to a remote panel or a monitoring station such as the fire brigade.

IG 01.03 A summary inventory of the existing systems is given in PIG – Particular Specification for the Fire Detection System.

IG 02 **STANDARD SPECIFICATIONS**

IG 02.01 **SABS standards and codes**

The latest revisions of the following SABS standards and codes shall apply:

- *SABS 10139: The prevention, automatic detection, and extinguishing of fire in buildings.*
- *SABS 10142: The wiring of premises.*
- *SABS EN 54: Components of automatic fire detection systems.*

IG 02.02 **Department of Public Works Specifications**

The following standard specifications of the Department of Public Works, and the standards referred to in these standard specifications shall apply:

- *Standard Specification for an Automatic Fire Alarm Installation, reference FPO/82/5E as revised.*

IG 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.

IG 02.04 **Manufacturers' specifications, codes of practice and instructions**

All the wiring, installation, maintenance, testing and other specifications of the manufacturer of the equipment shall be adhered to.

IG 02.05 **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.

IG 03 **DEFINITIONS**

The following definitions shall apply:

Class A wiring: Circuits capable of transmitting an alarm signal during a single open or non-simultaneous single ground fault on a circuit conductor shall be designated as Class A.

Class B wiring: Circuits not capable of transmitting an alarm beyond the location of the fault conditions specified for Class A above shall be designated as Class B.

Addressable system: A system in which signals from each detector and/or call point are

individually identified at the control panel.

Conventional system: A system that is not addressable.

Ring system: A wiring system where a return loop with no spurs (T-offs) is used. This normally provides a Class A wiring system if the control panel is so designed.

Isolating device: Devices that isolate a line to line short circuit so that only the section between the isolating devices will be effected. The effective use of an isolating device requires Class A wiring.

IG 04 OPERATING AND MAINTENANCE MANUALS

IG 04.01 PROCUREMENT OF AVAILABLE OPERATING AND MAINTENANCE INFORMATION

At the commencement of the contract, the Contractor shall obtain all available operating and maintenance documentation. Please note that although existing manuals may be available they may not be complete and additional information must be obtained. New manuals shall be compiled even if existing manuals exist.

The Contractor shall be responsible for the compilation of a complete set of drawings, inventory list and operating and maintenance manuals. This shall be done in accordance with the Additional Specification SB - Operating and Maintenance manuals.

The Contractor shall allow for the required tools and equipment to establish the correct information.

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

IG 04.02 INFORMATION REQUIRED IN MANUALS

Over and above what is specified in the Additional Specification - SB Operating and Maintenance manuals, the Operating and Maintenance Manual to be compiled shall be structured and shall at least include the following for each fire alarm panel. *Please adapt and add as required.*

Master manuals and manuals for each fire panel shall be prepared containing extracts from the master manuals.

IG 04.02.01 A complete listing of all the configuration and programming information of the control panel. Enough information must be supplied so that the control panel can be reconfigured by a person not knowledgeable of the site.

IG 04.02.02 Complete drawings showing the positions of all the devices connected to the system and schematic connection diagrams.

IG 04.02.03 Complete design information containing at least:

- Sizes of batteries and battery chargers. The quiescent and alarm current of the system must be included.
- Sizes of sirens and strobes.
- Types of detectors and other devices and their specifications.

IG 04.02.04 A full description of the system providing information similar to that shown in the table below.

SYSTEM DESCRIPTION	
Name of system	
Device	Manufacturer / type / description
Control panel	ZP2 Fire Panel Large Cabinet - 2 loop compelpre with 1XZP2-ZI-40,1 X ZP2-LB & 2 x BS131N or similar approved
Battery charger	Ziton or similar approved
Detectors	Annalogue Thermal (Ionization) Sensor ZP720-3 complete with base Polar White or similar approved
Detectors	Multisensor(optical and heat) detector including the surface base,Colour Polar White or similar approved
Detectors	Annalogue Adressiable Optical Smoke detector ZP730-2 & surface mounted detector base ZP7-SB1-P Polar White or similar approved
Break glass units	Ziton ZP785-3 or similar approved
Sounders/Strobes	Ziton ZP755B-2 or similar approved
Link to the fire brigade	GRPS (Cell Phone) Modem Link to local Fire Department.
Links to other systems	None

IG 04.02.05 A complete list of all the devices of the system providing at least the information indicated in the table below.

LIST OF DEVICES	
	Goldfields Building
Fire Panel: ZP2	1
Call-Point Break Glass	8
Optical Smoke Sensor	40
Thermal (Ionization) Sensor	2
Multisensor(optical and heat	4
Optical Smoke Sensor Fire Alarm Siren combination with Strobe light	6
Door closers and hold open magnets	

IG 04.02.06 A complete list of inputs and output to the system excluding the devices indicated in the list of devices above providing at least the information indicated in the table below. Examples of other inputs and outputs are:

- Activate fire doors when alarm occurs.

IG 05 **DETAIL OF REPAIR WORK**

There is no fire detection system at the Goldfields Education Centre. A new Fire Detection will be supplied, installed and commissioned under the contract.

IG 06 **MAINTENANCE**

The maintenance functions starts from day one of the contract even if the corrective maintenance has not been completed and shall consist of preventative and breakdown maintenance with the purpose of keeping the complete installation in fully working condition as specified in the additional specifications.

IG 06.01 The preventative maintenance shall be done according to the specifications of the manufacturer of the equipment and shall at least include the following:

- Testing of all the functions of the fire detection system in a period of 12 months.
- Testing, cleaning and servicing parts of the system every 3 months to ensure that the fire detection system functions correctly.

IG 06.02 Table 1 indicates recommended testing frequencies. (T for test and I for inspect)

No.	Part of the system	Quarterly	Annually
1	Alarm notification devices		Test
2	Batteries	Load voltage test	Discharge test
	Battery charger	Charger test	Charger test
3	Control equipment	Clean	Test all functions
4	Initiating devices	Activate and clean 25% of devices	Activate all devices
5	Interface equipment		Activate all devices
6	Labels, drawings & manuals	Update as required	
7	Supervisory signals (e.g. fire brigade)	Test	
8	Wiring		Check all terminations for bad connections.

IG 06.03 A brief description of some of the tests are given below but the specifications of the manufacturer shall also be followed.

Test	Description
Battery load voltage test for sealed lead acid batteries.	Apply a load of 0.1C with the battery charger disconnected. The battery voltage should be higher than 24.5V after 30 seconds.
Battery discharge test for sealed lead acid batteries.	Apply a load of 0.2C or the full alarm load (whichever is higher) with the battery charger disconnected. The battery voltage should be higher than 23V after 30 minutes or as recommended by the battery manufacturer.
Battery charger test	The charging voltage shall be between 27.0V and 27.6V with the batteries in a charged state. The ripple voltage should be less than 30mV.

IG 07 RECORD KEEPING AND LABELLING

IG 07.01 LABELS

All equipment shall have a unique number inscribed on a label and fixed to the equipment. These numbers shall correspond with that on the drawings and in the manuals.

IG 07.02 DESIGN INFORMATION

IG 07.02.01 The following information shall be indicated on a label:

- The battery type and size. (next to the batteries)
- The quiescent load and alarm load in amps of the system. (next to the batteries)
- The sizes of all the fuses. (next to the fuses)
- The dates that the batteries were installed. (on the batteries)
- The number of each detector, break glass unit, interface, relay or other activation or initiating devices. (on or next to the unit)

IG 07.03 RECORD KEEPING

A record shall be kept of each inspection and test in a book next to the fire panel.

The record book shall state at least the following:

- The date and name of the person and company.
- Comments on the tests or inspections.
- The voltages measured for the battery tests.

The date on which batteries were installed shall be clearly marked on the batteries and also indicated in the record book.

IG 07.04 INFORMATION CABINET

A neat, high quality cabinet or holder with a lock shall be provided next to the fire panel.

- IG 07.04.01** This cabinet shall have the following characteristics:
- It shall be wall mounted next to the fire panel.
 - It shall have a lock that opens with a general type of key such as the fire panel key or a square key.
 - It shall be large enough to hold the information indicated below but at least 350mm x 250mm x 50mm deep.
- IG 07.04.02** The information cabinet shall contain all the system specific information contained in the master manuals but at least:
- Basic operating instructions.
 - The complete design information.
 - The record book.
 - A full description of the system with drawings.
 - Configuration and programming information.

IG 07.04 **BLOCKED PLAN**

A framed drawing shall be fixed to the wall next to the fire panel and kept up to date with changed information on the fire detection system. The drawing shall contain at least the following:

- The building name as shown outside the building otherwise as known by the users of the building. The panel number shall also be shown.
- All the initiating devices and their numbers and types shall be shown.
- A symbol list of all the symbols used on the drawing.
- The positions and numbers of all the battery chargers and gas cylinders shall be shown.
- Detection and gas zones must be indicated.
- The drawing shall be at least A3 size but large enough to contain all the required information. The drawing shall be mounted behind glass with a hard wood frame.

IG 08 **DAMAGE CAUSED BY VOLTAGE SURGES**

All damage caused by lightning or power surges must be fixed under this contract. No such claims will be considered.

Please note that the Komatipoort area is very prone to lightning and voltage surges must therefore be expected.

The contractor is advised to install surge protection equipment on the systems and to regularly check the surge protection equipment for proper operation. Contact a specialised lightning specialist to assist with the design of the surge protection.

IG 09 **TEST EQUIPMENT**

The contractor shall ensure that the following equipment is available on site for the engineer's use.

- A digital multimeter.
- Smoke and heat detector testers suitable to reach heights of 6 meter.
- Testers to test batteries.
- Test equipment to test flame detectors, beam detectors, etc, if applicable.

IG 10 EQUIPMENT AND COMPONENTS REMOVED

All equipment and components of the fire detection systems that the contractor removes during a replacement action shall, where still usable be retained by the contractor and shall be used as spare parts to maintain other systems.

IG 11 MEASUREMENT AND PAYMENT

The measurement of items does not imply that those items form part of the scope of the work. Work shall be done according to the drawings, specifications and the instructions of the engineer.

IG.01 DEVICES & EQUIPMENTNumber

Devices are measured per item and include the removal of an existing device (if applicable) and the supplying, installation and testing of the replacement device. The price includes all wire connections, lugs, labels, mountings and updating of the manuals and drawings. The patching and touching up of paint, woodwork, plaster, etc. shall be included in the price.

IG.02 WIRING metre

All wiring shall include the supply, installation into conduit, wiring channel or any other medium and the testing thereof. Prices shall include wastage, off cuts, labels, etc. to make the installation complete. The measurement is the length installed.

IG.03 CONDUITS AND CONDUIT ACCESSORIES

See AB.

IG.04 TESTINGNumber

The testing of fire panels, detectors and other devices or systems shall include all the test equipment, obtaining testing procedures, changes to make the test possible, recommissioning of the device or system, test reports, etc. to make the test complete and acceptable to the engineer. All tests shall be done according to the manufacturer's specifications, standard specifications and the requirements of the engineer.

Test shall also include the calibration, cleaning of the unit and sending the unit to the supplier if the tests cannot be locally carried out.

IG.05 LABELSNumber

Prices shall include the supply and installation of the labels. Printed drafts of the labels shall be submitted to the engineer for approval before manufacture.

IG.05.01 Large labelsNumber

Labels for large equipment such as fire panels and battery charges shall be reverse engraved labels fixed to the equipment with screws. The labels shall be at least 20mm x 60mm.

IG.05.02 Small labelsNumber

Small labels shall be applied to smaller devices such as detectors and draw boxes. Labels for detectors and addressable devices shall be as supplied by the manufacturer of the device. Other small labels shall be of the laminated plastic type with a letter size of at least 4mm. The mounting surface shall first be cleaned with alcohol before fixing the label.

PARTICULAR SPECIFICATION

PJC CONVENTIONAL FIRE FIGHTING EQUIPMENT

CONTENTS

PJC 01	SCOPE
PJC 02	GENERAL DESCRIPTION OF INSTALLATION
PJC 03	TECHNICAL DETAILS OF EXISTING INSTALLATION
PJC 04	DETAILS OF REPAIR AND SERVICE WORK
PJC 05	MEASUREMENT AND PAYMENT

PJC 01 SCOPE

- (a) This specification covers the particulars of the corrective and maintenance work to the conventional fire fighting equipment installation at the various sites. This Particular Specification shall be read in conjunction with Technical Specification JC: Conventional Fire Fighting Equipment, and all additional and technical specifications compiled as part of this document, in particular the following Additional Specifications:

SA: General Maintenance
SB: Operating and Maintenance Manuals
SC: General Decommissioning, Testing and Commissioning Procedures
SD: General Training

The intended repair work to this installation will restore the existing installation to a safe, efficiently functional system that complies with all statutory regulations and applicable standards, in the process repairing all defects and shortfalls.

PJC 02 GENERAL DESCRIPTION OF INSTALLATION

(a) GOLDFIELDS EDUCATION CENTRE

The existing fire extinguishers and fire hose reels at Goldfields Education centre will be serviced and defective equipment will be replaced. Rusted and damaged fire equipment boxes will be replaced with stainless steel boxes.

PJC 03 TECHNICAL DETAILS OF EXISTING INSTALLATION

The equipment that is listed in the table below will be maintained as part of the Repair and Maintenance Contract. Newly installed fire fighting equipment shall also form part of the Contractors maintenance responsibilities.

PJC 04 **DETAILS OF REPAIR AND SERVICE WORK**

The following work shall form part of the intended repair work to the fire fighting equipment. This work shall be done in accordance with the relevant regulations, codes, specifications and Technical Specification JC: Conventional Fire Fighting Equipment.

The description of the repair work as set out below shall be read in conjunction with the Schedule of Quantities and Technical Specifications.

PJC 04.01 **GENERAL DESCRIPTION OF REPAIR WORK**

PJC 04.01.01 The Contractor shall, at the start of the Contract, have the items, systems, equipment and installations listed below inspected by qualified personnel. This inspection shall include the establishing of any defects, leaks, conditions, damages, shortfalls, repairs required, details of existing equipment, suitability of equipment for the purpose it serves, etc. The Contractor shall report 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) Correlation of all fire fighting equipment;
- (b) Last service record;
- (c) Inventory list of all equipment;
- (d) Compliance with present governing regulations;
- (e) Accessibility to equipment;
- (f) Dynamic water pressure under flow conditions of equipment;
- (g) As-built information.

PJC 04.01.02 The general scope of work at the time of going on tender is defined as follows:

- (a) Replacing of irreparably damaged, missing and unsuitable fire fighting equipment;
- (b) Servicing and overhauling of all fire hose reels and fire hydrants;
- (c) Servicing and recharging of all fire extinguishers;
- (d) Replacing of missing and damaged fire extinguisher brackets;
- (e) Replacing damaged fire hose reel cabinets;
- (f) Supply and installation of additional fire hose reels, hydrants and extinguishers where necessary, in accordance with the requirements of SABS 0400;
- (g) Servicing and overhauling of fire booster and pump connections;
- (h) Compilation of fire plan for each of the service buildings;
- (i) Compilation of inventory list with all relevant details and an identification system to all equipment.

PJC 04.02 **REPAIR WORK TO FIRE FIGHTING EQUIPMENT**

The repair work to this installation shall include, but not be limited to at least the following items. Any items, components or installations not detailed in this specification but found to be defective or inoperative during the inspection and report phase, shall be repaired or replaced as instructed by the Engineer.

PJC 04.02.01 **Goldfields Education Centre**

- (a) Service existing fire extinguishers
- (b) Replace broken and rusted fire extinguisher cabinets
- (c) Replace broken and rusted fire hose reel cabinets
- (d) Replace defective fire extinguishers
- (e) Compile fire plans for operational buildings
- (f) Add additional fire fighting equipment according to SANS 0400

(g) Fire fighting training

PJC 05 **MEASUREMENT AND PAYMENT**

All new building work and corrective work to existing structures and buildings resulting from repairs to the conventional fire fighting equipment as scheduled, shall be done in accordance with the Specifications for the structural and building section included elsewhere in this Tender Document. The costs of such building and repair works shall be deemed to be included in the tendered rates for the applicable items scheduled in this section.

PJC.01 **INSPECTION AND REPORT ON EXISTING INSTALLATIONS**Unit: item

The tendered sum shall include full compensation for the inspection and written report on all items, systems, components, equipment and installations, including the establishment of any defects, leaks conditions, damages, shortfalls, structural soundness, repairs required, details of existing equipment and suitability of the equipment for the purpose it serves.

PJC.02 **AS-BUILT INFORMATION AND OPERATING AND MAINTENANCE MANUALS** Unit: sum

The tendered sum shall include full compensation for the compilation and submission of seven complete sets of inventory lists and operating and maintenance manuals in accordance with Additional Specification SB: Operating and Maintenance Manuals.

The tendered sum shall also include full compensation for all equipment necessary to establish the exact position and level of underground services, as well as the recording of all information on electronic drawing format.

PJC.03 **ISOLATION, STRIPPING, DISMANTLING AND REMOVAL OF EXISTING FIRE FIGHTING EQUIPMENT** Unit: number

The tendered rates shall include full compensation for the isolation, stripping, dismantling and removal of irreparable damaged, broken or unsuitable fire hydrants, fire hose reels and fire extinguishers, including all valves, cabinets, mounting brackets, streamers, etc, as well as removal off site and/or storage of all removed items mentioned above.

PJC.04 **SUPPLY AND INSTALLATION OF FIRE HYDRANTS**.....Unit: set

The tendered rate shall include full compensation for the supply, delivery, positioning, installation, testing, commissioning and hand-over of fire hydrants, including all necessary pipework, cabinets, cupboards, valves, brackets, fittings, bends and the reinstating of existing surfaces such as walls, floors, ceilings, etc.

The tendered rate shall also include full compensation for the supply, delivery and positioning and fixing of all fire signage as required by regulation.

The tendered rate shall also include full compensation for the labelling with identifying tags and recording of details of all equipment.

PJC.05 **SUPPLY AND INSTALLATION OF FIRE HOSE REELS** Unit: number

The tendered rate shall include full compensation for the supply, delivery, positioning, installation, testing, commissioning and hand-over of fire hose reels, including all necessary

pipework, cabinets, cupboards, valves, brackets, fittings, bends and the reinstating of existing surfaces such as walls, floors, ceilings, etc.

The tendered rate shall also include full compensation for the supply, delivery and positioning and fixing of all fire signage as required by regulation.

The tendered rate shall also include full compensation for the labelling with identifying tags and recording of details of all equipment.

PJC.06

SUPPLY AND INSTALLATION OF FIRE EXTINGUISHERS

Unit: number

The tendered rate shall include full compensation for the supply, delivery, positioning, installation and hand-over of the fire extinguishers, including all necessary brackets, backboards, etc.

The tendered rates shall also include full compensation for the supply, delivery, positioning and fixing of all fire signage as required by regulation.

The tendered rate shall also include full compensation for the labelling with identifying tags and recording of details of all equipment.

PJC.07

SERVICING, CLEANING AND REPAIR OF FIRE HYDRANTS

Unit: number

The tendered rate shall include full compensation for the repair or replacement of damaged, broken, leaking or corroded pipework and fittings, main hydrant seals, quick coupling catches, shaft ends for right-angle hand wheel type hydrants, streamers, hose nozzles, valve steam seals, fire cupboard doors and locks, damaged, missing or shortfall fire signage, etc.

The tendered rate shall also include full compensation for the labelling with identifying tags and recording of details of all equipment.

PJC.08

SERVICING, CLEANING AND REPAIR OF FIRE HOSE REELS

Unit: number

The tendered rate shall include full compensation for the repair or replacement of damaged hose drums, mountings and shut-off valves, replacement of damaged or missing 30 m hoses, hose nozzles, shut-off valve wheel handles, hose drum seals where leaks occur, gland packing and gaskets of shut-off valves, repainting of deteriorated paintwork, replacement of fire cupboard doors and locks, damaged, missing or shortfall fire signage, etc.

The tendered rate shall also include full compensation for the labelling with identifying tags and recording of details of all equipment.

PJC.09

SERVICING, CLEANING, RECHARGING AND REPAIR OF FIRE EXTINGUISHERS

Unit: number

The tendered rate shall include full compensation for the repair or replacement of all damaged, faulty or missing discharge hoses and nozzles, pressure gauges, operating instructions, the recharging of discharge cylinder to required capacity for DCP, water and foam extinguishers, and the recharging of CO₂ extinguisher to capacity, repair, resealing of CO₂ discharge mechanism, checking, servicing and repairing of activation mechanisms, replacement of water and foam extinguishers that have corroded cylinders, replacement of DCP, water or foam content of extinguishers, the replacement of fire cupboard and cabinet doors and locks, damaged, missing or shortfall fire signage, brackets and backboards, etc.

The tendered rate shall also include full compensation for the labelling with identifying tags and recording of details of all equipment.

PJC.10 COMPILATION OF FIRE PLAN FOR EACH OF THE SERVICE BUILDINGS Unit: number

Provision of a "Fire Plan". The Contractor shall provide a Fire Plan (Emergency Evacuation Plan) indicating positions, and keeping up to date any changes of the equipment position, status and operation.

The unit of measurement shall be for each service building for which the fire plans were developed, printed and laminated. The tendered rate shall include full compensation for all drawings, printing, duplicating and laminating.

. PJC.11 FIRE FIGHTING TRAINING Unit: number

The tendered rate shall include the number of training sessions conducted for a maximum of 20 attendees including all training material, transport and training aids required.

The end user shall be trained, by the supplier of the fire fighting equipment, to operate the individual fire fighting equipment. Fire Fighting training shall be done by a national accredited training institute (Fire Protection Association of South Africa).

PJC.12 SERVICING, CLEANING AND REPAIR OF FIRE BOOSTER PUMP ROOM Unit: number

The tendered rate shall include full compensation for the execution of a full engine service as per the manufacturer's recommendations including air, fuel and oil filters, oil, replacement of wiring, V-belts and hoses as needed and other consumables required including the steam cleaning of the assembly.

The tendered rate shall also include full service of all the listed equipment in PJC.03 that includes the pumping equipment and motor control centre and replacing the batteries in the motor control centre.

PJC.13 SUPPLY AND INSTALLATION OF FIRE EQUIPMENT SIGNAGE Unit: number

The tendered rate shall include full compensation for the supply, delivery, positioning, installation and hand-over of the fire signage as required by regulation, including all necessary brackets, frames, etc. as described in the schedule of quantities.

PJC.14 LABELLING OF ALL CONVENTIONAL FIRE FIGHTING EQUIPMENT WITH IDENTIFYING TAGS AND RECORDING OF DETAILS Unit: number

The tendered rate shall include full compensation for the supply, delivery, positioning, and installation of identifying tags which must be in a printed or engraved format on each type of fire fighting equipment and bracket or holder.

The tendered rate shall also include full compensation for the supply, delivery, positioning, installation of labels on existing cabinets, cupboards, valves, brackets,

PJC.15 **SUPPLY OF DIESEL FUEL**Unit: Litre

The unit of measurement shall be the quantity of diesel fuel supplied, delivered and transferred into day/bulk tanks upon instruction from the Engineer.

The tendered rate shall include full compensation for the supply, transport and transfer of diesel fuel.

PJC.16 **REPLACE STARTER BATTERY**Unit: number

The unit of measurement shall be the number of diesel starter batteries replaced.

The tendered rate shall include full compensation for the removal of the existing battery, the installation and reconnection of a new “Deltac Heavy-Duty Freedom”-type battery and final test of start up volt drop.

PJC.17 **SERVICE UPS ELECTRONIC AND BATTERY CABINET**Unit: number

The unit of measurement shall be the number of UPS systems opened and serviced in accordance with manufacturer’s instructions

The tendered rate shall include full compensation for the opening, cleaning , visual inspection of cable terminations, ventilating fans, battery links and the recording of earthing resistance.

The tendered rate shall further include full compensation for the testing of all control cards and replacement of any defective control cards.

PJC.18 **REPLACE UPS BATTERIES**Unit: number

The unit of measurement shall be the number of batteries replaced.

The tendered rate shall include full compensation for the disconnection and safe disposal of old batteries and supply, installation and connection of new sealed UPS batteries.

PJC.19 **SUPPLY AND INSTALL UPS UNIT**Unit: number

The unit of measurement shall be the number of UPS units as specified supplied and installed.

The tendered rate shall include full compensation for the disconnection of the old UPS unit and supply, installation and connection of new UPS unit including testing and commissioning.

PARTICULAR SPECIFICATION

PVS PHOTOVOLTAIC SPECIFICATION

CONTENTS

PVS 1	SCOPE OF WORK
PVS 2	STANDARD SPECIFICATIONS
PVS 3	OCCUPATIONAL HEALTH AND SAFETY ACT OF 1993
PVS 4	MUNICIPAL REGULATIONS, LAWS AND BY-LAWS
PVS 5	EXTENT OF WORK
PVS 6	CERTIFICATE OF COMPLIANCE
PVS 7	GENERAL REQUIREMENTS
PVS 8	DRAWINGS
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PVS 10	PV INSTALLATION DETAILS
PVS 11	TESTING AND COMMISSIONING
PVS 12	MEASUREMENTS AND PAYMENT

PVS 01 SCOPE OF WORK

This specification covers the installation, testing, commissioning of solar photovoltaic system and appurtenant devices.

PVS 01.01 PHOTOVOLTAIC SOLAR AND BACKUP BATTERIES INSTALLATION:

Supply and install additional PV solar panels

Supply and install battery backup bank

Supply and install solar and battery inverters

Supply and install all other related items such as fuses, wiring cables, connectors and PV earthing system.

Supply and install PV mounting structure over parking area.

PVS 02 STANDARD SPECIFICATIONS

PVS 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:

General	Distribution and meter boards	LV cables and conductors	Embedded Generation	Earthing and lightning protection system	Batteries	Conduits, power-skirting, cable trays and ducting
SANS 10142	SANS 152	SANS 10198	NRS 097	SANS 03	IEC 60086	SANS 950
SANS 10160	SANS 156	SANS 1411	NRS 048	SANS 10199	IEC 61427	SANS 1065
SANS 10400	SANS 172	SANS 1507	IEC 60364			SANS 1085
SANS 1222			NRS 052			

PVS 02.02 STANDARD SPECIFICATIONS FOR NON-GRID CONNECTED SYSTEMS

Solar PV systems of nominal capacity less than 100kW shall at minimum comply with the following standards:

- NRS 052-3:2008: Off-grid solar home systems.
- IEC 61194: Characteristic parameters of stand-alone photovoltaic (PV) systems.
- IEC 61702: Rating of direct coupled photovoltaic (PV) pumping systems.
- IEC/PAS 62111: Specifications for the use of renewable energies in rural decentralised electrification.
- IEC 62124: Photovoltaic Stand-Alone Systems - Design Qualification and Type Approval.

- IEC 61173: Overvoltage protection for photovoltaic (PV) power generating systems - Guide.

Charge Controllers

- IEC 62509: Battery charge controllers for photovoltaic systems - Performance and functioning.
- IEC 62093: Balance-of-system components for photovoltaic systems - Design qualification natural environments.

Batteries

- IEC 60086: Primary batteries
- IEC 61427: Secondary cells and batteries for solar photovoltaic energy systems - General requirements and methods of test.
- IEEE Std. 937: Recommended practice for installation and maintenance of lead-acid batteries for PV systems.
- IEEE Std. 1013: Recommended Practice for Sizing Lead-Acid Batteries for Photovoltaic (PV) Systems.
- IEEE Std. 1361: Recommended practice for determining performance characteristics and suitability of batteries in PV systems.

PVS 02.03 PHOTOVOLTAIC MODULES

The standards for PV modules have been categorized according to concentrating and non-concentrating. For definitions and terms used in the PV industry, please refer to IEC 61836: Solar photovoltaic energy systems - Terms, definitions and symbols.

A. Non- concentrating

- IEC 61724: Photovoltaic system performance monitoring – Guidelines for measurement, data exchange and analysis
- IEC 61727: Photovoltaic (PV) systems - Characteristics of the utility interface
- IEC 61215: Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval
- IEC 61646: Thin-film terrestrial photovoltaic (PV) modules - Design qualification and type approval
- IEC 61730: Photovoltaic (PV) module safety qualification
- IEC 61277: Terrestrial photovoltaic (PV) power generating systems - General and guide.

B. Concentrating

- IEC 62108: Concentrator photovoltaic (CPV) modules and assemblies - Design qualification and type approval.

- IEC 62688: Concentrator photovoltaic (CPV) module and assembly safety qualification.
- IEC 62670-1: Concentrator photovoltaic (CPV) module and assembly performance testing and energy rating - Part 1: Performance measurements and power rating - Irradiance and temperature.
- IEC 62670-2: TS Concentrator photovoltaic (CPV) module and assembly performance testing and energy rating - Part 2: Energy rating by measurement.

PVS 02.04 INVERTERS

- IEC 62109-1 Safety of power converters for use in photovoltaic power systems - Part 1: General requirements.
- IEC 62109-2 Safety of power converters for use in photovoltaic power systems - Part 2: Particular requirements for inverters.
- IEC 61683 Photovoltaic systems - Power conditioners - Procedure for measuring efficiency.
- UL 1741: Standard for Inverters, Converters, and Controllers for Use in Independent Power Systems.

PVS 02.05 BALANCE OF SYSTEM

- IEC 60870 Telecontrol equipment and systems
- IEC 62093: Balance-of-system components for photovoltaic systems - Design qualification natural environments.

PVS 03 OCCUPATIONAL HEALTH AND SAFETY ACT OF 1993

All regulations and statutory requirements as lay down in the latest edition of the Occupational Health and Safety Act, 1993 (Act no 85 of 1993) shall be adhered to.

PVS 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.

PVS 05 EXTENT OF WORK

The work covered by this contract comprises the complete PV solar supply design, specify , installation, test and commission, in working order, as described in scope work and as per this specification, including the supply and installation of all fittings and also the installation of any additional equipment supplied by the Engineer.

PVS 06 CERTIFICATE OF COMPLIANCE

All installations must be installed and tested in accordance with SANS 10142-1 and IEC 60364-7-712. On completion of the service, a certificate of compliance must be issued to the Engineer's Representative/Agent in terms of the Occupational Health and Safety Act, 1993 (Act 85 of 1993).

PVS 07 GENERAL REQUIREMENTS

The photovoltaic installation shall be carried out by and certified PV installer only. Equipment and material installed shall be new and unused.

Only materials of first-class quality shall be used and all materials shall be subject to the approval of the Engineer. Samples or datasheets of items must be approved by Engineer before complete purchase of all items required.

Wherever applicable the material is to comply with the relevant South African Bureau of Standards (SANS), specifications, or to International Electrotechnical Commission (IEC), where no SANS Specifications exist. Materials wherever possible, must be of South African manufacture.

The PV installation will supply power to the Gold Fields Educational Centre. The Gold Fields Educational Centre is located in the local SANBI Kirstenbosch power grid which receives power from Eskom at two local grid connection points.

The method of operation shall be that power generated from the PV panels will be utilised when available to power the building and recharge the batteries. Excess power generation will be supplied back into the local SANBI operated grid.

The installation shall include 44 JA Canadian 365W mono PV or similar approved panels mounted on a new carport structure. 20kW Hybrid inverter(s) to house all 44 panels suitable strings or similar approved. Excess power generated from the PV panels will recharge a 6x 5kW Lithium-Ion battery bank.

The Gold Fields Educational Centre will draw power from the battery bank when PV generated power is not available until the battery bank reaches minimum charge. Once the battery bank has reached the minimum allowable charge then power will be drawn from the local SANBI grid to power the building.

Batteries can be charged from grid power in the event that PV power is not available due to overcast weather conditions or unavailability of the PV system power.

The system must include a by-pass that allows for power to be supplied directly from the local SANBI grid to the Golds Fields Centre.

The new carport structure will feature a slanted top at 5° and facing North. The contractor will be responsible for mounting structures for the PV panels onto the carport structure.

The overall layout as follows:



PVS 08 DRAWINGS

The drawings supplied by Engineer generally show the scope and extent of the proposed work and shall not be held as showing every minute detail of the work to be executed.

The position of electrical boards or system connection points must be established on site, prior to these items being built in.

Upon confirmation of appointment, the contractor shall issue single-line drawing showing the complete system design for approval with Engineer

PVS 09 AS-BUILT INFORMATION AND OPERATING AND MAINTENANCE MANUALS

The Contractor shall be responsible for the compilation of an inventory and operating and maintenance manuals supplied in three sets.

PVS 10 PV INSTALLATION DETAILS

PVS 10.01 INSTALLATION DESCRIPTION

PV Solar installation and Electrical systems to the Gold Fields Educational Centre. The internal electrical work of the buildings does not form part of this installation. This installation must include:

1. Interpreting 3-phase power supply from local Kirstenbosch power distribution network
2. 20kWh battery bank (20kWh functional capacity, DOD requirements to be calculated and accounted for by contractor).
3. Inverter units(s) to supply 3-Phase power to the Gold Fields Educational Centre, including all associated cabling, installation, equipment, labour etc.
4. Mounting of 44x Solar Panels on top of a new carport structure (carport to be constructed by others) including all associated cabling, installation, labour, joining.
5. Programming and control of the power supply system to set priority for sourcing power.

PVS 10.02 PHOTOVOLTAIC INSTALLATION

PVS 10.02.01 GENERAL:

- Contractor is responsible for complying with all relevant local & national codes for installing the PV system
- All conductors shown on this sheet shall be copper
- Breaker wiring convention: utility side is always the top of the breaker, and load/inverter side into the bottom of the breaker
- Inverter supplies shall feed in on the utility side of any power factor correction device and/or diesel generator changeover switch unless specifically noted
- Ac & dc cables shall not be in the same wireways
- Phase conductors shall not be green/yellow or black
- Wireways and any other exposed metal parts within reach shall be earthed
- The contractor shall ensure reliable electrical connection between PV panel frames, mounting structure & ground wiring, and between interconnected mounting structures.
- Cables shall not lie loose on roof.
- No part of cables shall be exposed to direct sunlight.
- Plastic cable ties shall not be used where exposed to direct or indirect sunlight.
- Each string pair's conductors shall be labelled for easy identification.
- The battery inverter must be supplied complete with charge controller.

PVS 10.02.02 PV PANEL EARTHING:

- 6mm² bare copper earth wiring connects PV panel frames, mounting structures & surge arrestors to ground spike. Use separate earth electrode close to panels if excessive distance to main DB earth electrode.
- Use earth continuity wire of 10mm² to connect this earth to the main DB earth electrode.

PVS 10.02.03 LABLING & DANGER SIGNS:

- A string layout diagram must be displayed near the distribution boards, clearly indicating how PV strings are connected to inverters and DBs
- Labelling application: permanent, coloured red, and with white lettering of height at least 8 mm.
- Label below PV AC breaker in DBs:
"Solar supply main switch"
- Label on outside of DBs:
"Warning: dual supply. Isolate both normal & solar/ups supply before working on this board"
- Label on outside of DBs:
"On-site embedded generation (EG) connected. Use selector switch to switch between the supplies."
- PV string junction box (if specified):
"Caution: high voltage dc cable. Do not disconnect under load."
- PV array junction box (if specified):
"Danger: contains live parts during daylight."
- DC cables within reach:
"Caution: high voltage dc cable."

PVS 10.03 GENERAL

- Inverter and Battery monitoring system shall be provided by contractor
- Design shall incorporate 44 new 365W mono solar power panels subject to Engineer approval.
- Delivery of all equipment shall be included in contractor final pricing including all labour related fees

PVS 10.04 ISOLATORS

- Isolators shall be similar or approved equal to GEWISS GW70432 or Lumex Clipsal type WHD.
- The isolators shall be the water resistant, surface mounted type installed in a non-corrosive enclosure

- The enclosure shall bear a permanently fixed (screwed) engraved Traffolite label indicating the DB and circuit number.

PVS 10.05 WIRING

Wiring shall not be drawn into conduit until the conduit installation has been completed, fitted with bushes and all moisture and debris have been removed.

Joints of any kind will not be permitted in wiring. No more than 2 single or 1 three phase circuit may be drawn into any 20mmø conduit.

PVS 10.06 D.C. CIRCUITS - INSTALLATION

Personnel

All persons working on the live DC cabling of a Photovoltaic (PV) system must be experienced / trained in working with such systems and fully acquainted with the voltages present on that system in particular.

Sequence of Works

All DC wiring should if possible be completed prior to installing a PV array. This will allow effective electrical isolation of the DC system (via the DC switch-disconnector and PV module cable connectors) while the array is installed; and effective electrical isolation of the PV array while the inverter is installed.

Typically, this would require an installation sequence of:

- DC switch-disconnector and DC junction box(es)
- String/array positive and negative cables - from the DC disconnect/junction box to either end of the PV string/array.
- PV array main cables from DC switch to inverter.

This should be carried out in such a way that it should never be necessary for an installer to work in any enclosure or situation featuring simultaneously accessible live PV string positive and negative parts.

Note: While the installer will be handling live cables during the subsequent module installation, because the circuit is broken at the DC switch-disconnector, there is no possibility of an electric shock

current flowing from the partially completed PV string. The maximum electric shock voltage that should ever be encountered is that of one individual PV module.

Where it is not possible to pre-install a DC isolator (eg a new-build project where a PV array is installed prior to the plant room being completed), cable ends/ connectors should be put temporarily into an isolation box and suitably labelled (as per DC junction box – section PVS 10.02.03).

Cables are to be well supported, especially those cables exposed to the wind. Cables must be routed in prescribed zones or within mechanical protection, fully supported / cable tied (using UV stabilised ties) and they must also be protected from sharp edges.

Live Working

A temporary warning sign and barrier must be posted for any period while live PV array cables or other d.c. cables are being installed.

PVS 10.07 ARRAY MOUNTING

The manufacturer's instructions should always be observed when designing a PV array mounting structure. In particular, attention shall be paid to the clamping zones as prescribed by each manufacturer as these will often vary.

PVS 10.08 LOAD CALCULATIONS

The design and specification of the PV array mounting system should take into account the wind and snow loads to be expected. Wind loads vary considerably across locations and are influenced by factors such as site altitude, building height and local topography.

Even where an approved mounting system kit is utilised, site specific calculations will be required to ensure that the system proposed is sufficient to withstand the imposed loads.

The PV array fixings (type and quantity) shall be checked to ensure that they can withstand the imposed (dead) load and wind uplift loads as calculated.

The roof structure shall be checked to ensure it can withstand the imposed loads as calculated. This is to include a site inspection by a suitably competent person.

PVS 10.09 SYSTEM MONITORING

The system shall comprise of panels, system and battery monitoring whose information shall be transmitted to a remote monitoring station (computer or mobile). Quantities to be monitored shall be voltage, current, and capacity for battery bank. All other items such as solar panels, MPPTs, inverters

shall be monitored using a centralised monitoring system. In case of network transmission failures to remote stations, data shall be stored internally for up to 48 hours

PVS 11 TESTING AND COMMISSIONING

PVS 11.01 TEST TO BE PERFORMED

Inspection and testing of the completed system to the requirements of SANS must be carried out and documented. Inspection and testing documentation for the AC side may comprise of 3 documents:

- Electrical installation certificate,
- Schedule of items inspected
- Schedule of test results

The inspection and testing of the DC side of the PV system shall be in accordance with the requirements of SANS and may include:

- Inspection schedule
- Continuity test of protective earthing and/or equipotential bonding conductors (if fitted)
- Polarity test
- String open circuit voltage test
- String short circuit current test
- Functional tests
- Insulation resistance of the d.c. circuits

PVS 11.05 TEST CONDITIONS

All tests shall be performed on site.

PVS 11.06 ADDITIONAL TESTS

Additional tests may be specified in the detail of work.

PVS 12 MEASUREMENT AND PAYMENT

PVS 12.01 SUPPLY, DELIVERY AND INSTALLATION OF EQUIPMENT.....UNIT: NUMBER

The unit of measurement shall be the number of specified items and other equipment units supplied, delivered and installed.

The tendered rates shall include full compensation for the design, manufacture, corrosion protection, patent rights, pre-delivery testing and test certificates, transport for delivery to site and off-loading, including all handling of the equipment. The equipment shall include the following:

- Solar panels
- Inverters
- Battery backup
- PV power cable
- All required installation materials, labour and consumables to render a complete and working installation.

Separate items will be listed in the Schedule of Quantities for different types and sizes of equipment.

PVS 12.02 TESTING AND COMMISSIONING OF EQUIPMENT.....UNIT: NUMBER

The unit of measurement shall be the number of main equipment units tested and commissioned.

The tendered rates shall include full compensation for the site handling and positioning of the equipment, including the fastening of the equipment in its designated position.

The tendered rates shall include full compensation for all preliminary tests, efficiency tests if required and commissioning tests. Commissioning tests shall comply with the section dealing with testing and commissioning.

Separate items will be listed in the Schedule of Quantities for different types and sizes of equipment.

PVS12.03 COMPILATION OF DRAWINGS.....UNIT: SUM

The unit of measurement shall be a sum for drawings compiled.

The tendered rates shall include full compensation for drawing, printing, computer time and any other associated costs necessary for the compilation the required drawings.

**PVS12.04 COMMISSIONING AND TESTING OF INSTALLATIONS SYSTEMS AS A WHOLE
..... UNIT: SUM**

The unit of measurement shall be a sum.

The bid sum shall include full compensation for commissioning of the installations specified and listed as part of the system as a whole and for all costs and expenses related to labour, removal, repair, reinstallation and testing of material components and equipment during the commissioning period for each part of the system. The bid sum shall include full compensation for the final commissioning and testing, including Day 1 and Day 30 tests and all work during the 30 day commissioning period of all parts and components of the system to the specified functional condition.

All work, handling of temporary live electrical cables, lock-out and tag out procedures, temporary diversion of flows and all safety requirements shall be included in the bid sum. All actions for on-site testing, sampling, analysis, logging of data and recording of results shall be covered under the costs for commissioning. The contractor shall also be responsible for assisting the client with operation of the system during the commissioning period, all related costs deemed included with the bid sum.

Payment shall be based on successful completion of the Day 30 tests.

ADDITIONAL SPECIFICATION

SB OPERATING AND MAINTENANCE MANUALS FOR MECHANICAL AND ELECTRICAL EQUIPMENT/ INSTALLATIONS AND SITE LAYOUT PLAN(S)

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	SCOPE OF SITE LAYOUT PLAN
SB 06	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 and as defined in the Additional Specification SA: General Maintenance. Existing Operation and Maintenance Manuals shall be revised and updated. Existing manuals that are still serviceable shall be scrutinised and certified correct and appropriate.

The contractor will furthermore be responsible for compiling and updating site layout plan(s).

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/manufacture
- (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 refer to Additional Specification SA: General Maintenance, to 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 **SCOPE OF SITE LAYOUT PLAN**

This specification provides minimum requirements for the preparation of a Site Layout Plan and is based on the specifications of the Department of Public Works.

SB.05.01 **SPECIFICATIONS**

The Specification is based on the following specifications:

1. Civil Engineering Manual PW347/2012, Annexure A1
2. Specification of Materials and Methods to be Used PW371
3. Additional Specification SB: Operating and Maintenance Manuals.

•

Compile and supply a complete Site Layout Plan:

(a) Detail Ground Survey

All services must be shown on a complete Site Layout Plan as required by the Engineer, including roads, fences, paving, transmission and telephone lines, etc. For sewerage reticulation and storm water drainage systems the pipe sizes, as well as invert heights must be provided. An effort must be made to trace the routes of these services.

(b) Survey of Buildings

The “footprint” of all the buildings and structures must be surveyed.

(c) General

All survey data shall be captured in electronic format.

SB.05.02 **TITLE BLOCK**

The standard drawing sheet layout and title block of the Department of Public Works must be used.

Complete all the relevant fields in the title block with reference to the name of the Port of Entry in the appropriate block. The words SITE LAYOUT PLAN should form part of the drawing title.

SB.05.02.01 **Drawing Number**

The drawing number should consist of a four-part identifier:

- Port of entry designator: WCS 045305
- Group: 1
- Drawing number: Numbering will start at 1
- Revision number: Will start at 01

Typical example: WCS 045305/1/1 Rev 01

SB.05.02.02 **Overlay Sheets/Layering Scheme (if required)**

The overlay sheet designator identifies the type of drawing (example: overlay for water reticulation) and can be added to the drawing number:

- C: Existing structures, facilities, roads, paving, fencing, etc
- CR: Storm water drainage system
- CE: Electrical power and equipment
- CF: Fire fighting equipment
- CS: Sewer network
- CT: Telephone lines
- CW: Water reticulation system

Typical example for the numbering of an overlay sheet:

WCS 045305/1/**CW**/1 Rev 01

SB.05.03 DRAFTING CONVENTIONS

The Site Layout Plan should be created following engineering conventions and standards in order to represent a clear drawing simplifying the huge amount of visual information.

SB.05.03.01 Paper Prints

Preference is given to size A1 plans, but for reporting size A3 will be used and the information should still be legible in this format.

SB.05.03.02 Scale

The Site Layout Plan must be drawn according to scale and the following scales can be used:

- 1:200 or
- 1:500 or
- 1:1000

SB.05.03.03 Plan Orientation

The Port of Entry should be rotated on the plan so that the north point arrow are pointing in the direction of either the upper left or upper right quadrants of the plan. The north point arrow to be placed in the top right hand corner of the drawing space.

SB.05.03.04 Contours

Contours do not form part of the Site Layout Plan.

SB.05.03.05 Line Weight



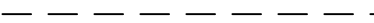
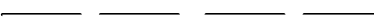


Line weight/width is extremely important and features such as the services should be drawn with lines that are more prominent. The following line weights (mm) can be used:

- | | |
|---------|---------|
| 1. 0.10 | 5. 0.35 |
| 2. 0.15 | 6. 0.50 |
| 3. 0.25 | 7. 0.70 |
| 4. 0.30 | 8. 1.00 |

SB.05.03.06 Line Type/Style

The following typical standard line types that can be used:

TYPICAL LINE TYPES

LINE DESCRIPTION	LINE APPEARANCE
1. Centre Line	
2. Solid/Continuous line	
3. Short broken line	
4. Long broken line	
5. Break line	
6. Hatch lines 45°	

SB.05.03.07 Hatching

Hatching are angled line patterns to indicate the position of permanent structures. The spacing between lines should be consistent at 45° to the structure. Park Homes must be shown on the plan, but without hatching.

SB.05.03.08 Surfaced Areas








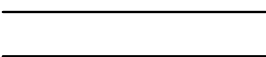
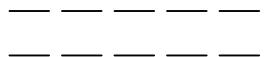

Surfaced roads should be indicated by two solid lines as well as paved areas.

Two long broken lines should be used to indicate gravel roads.

SB.05.03.09 Non Standard Line Types

The following lines could be used for the various services, but must be identified in the Legend as a non-standard line type:

LEGEND

		<u>Colour Code</u>	<u>Line Weight (mm)</u>
	Water pipe line	Cyan	0.50
	Sewer pipe line	Black	0.50
	Electrical overhead line	Magenta	0.50
	Electrical cable	Magenta	0.50
	Telephone line	Green	0.50
	Gas pipe line	Brown	0.50
	Fence line	Black	0.30
	Surfaced Road	Black	0.30
	Gravel Road	Black	0.30
	Railway Line	Black	0.25

SB.05.03.10 Lettering and Font Styles

Use the standard font style and font size for engineering drawings and do not use stylized fonts.

Create all text in upper case letters, except for certain unit designations such as km, m, mm, kVA, etc.

SB.05.03.11 Site Layout Plan

When the Port of Entry is too large for one sheet, divide the plan into logical sections. Add a key layout in the title block showing how the various sheets should be joined together to obtain a layout of the entire site. This key layout should form part of each sheet.

SB.05.03.12 Facilities

The name of the facility should be written adjacent to the facility. If the space is limited, a reference number of the facility, which refers to a description of the facility, is inserted in a table format in or close to the title block as a legend.

SB.05.03.13 Fences and gates

Show the position of the security fence and all other fences as well as gates. Include the height of all fences.

SB.05.03.14 Destinations

The destination to the nearest town with a pointing arrow should appear on all incoming and outgoing roads.

SB.05.04 SERVICES

The position of the services is extremely important and should be indicated by lines that are more prominent/thicker. The description of the line types for the various services must be given in the Legend. See DIR04.09.

The following services, where applicable, must be shown on the Site Layout Plan for future reference:

SB.05.04.01 Water Reticulation System

Show the position of the water reticulation system and include the following:

- Pipe lines, pipe sizes, type of pipes, valves, meters, boreholes and tanks (include capacities). Show the direction of flow.

SB.05.04.02 Sewerage Network

Show the layout of the sewerage network and include the following:

- Pipe lines, pipe sizes, type of pipes, manholes, rodding eyes, septic tanks (include capacities), french drains (include volumes). Show the invert levels of all manholes as well as the position and level of the bench mark.

SB.05.04.03 Electrical Power

Indicate the position of electrical power lines, cables, substations, kiosks, flood lights along the perimeter as well as street lights and area lighting.

Air-conditioning units should be numbered and listed in table format including the type and size.

Give the source(s) of electrical power.

SB.05.04.04 Telephone Lines

Show the position of overhead telephone lines.

SB.05.04.05 Storm water System

Show the layout of the storm water system, culverts and sizes as well as inlet and outlet structures. Give the invert levels of all structures as well as the position and level of the bench mark.

SB.05.04.06 Fire Fighting Equipment

Include the pump installation, tank and capacity, fire hydrants, valves, meters, fire extinguishers and fire hose reels.

Fire extinguishers should be numbered and listed in table format including the type and size.

SB.05.05 ELECTRONIC FORMAT

A complete set of electronic files shall be placed on CD(s) in a Data Exchange Format (DXF) or DWG format.

Affix a stick-on label to the CD with the following information:

- Department of Public Works and logo
- Name of Port of Entry
- WCS number
- Description: SITE LAYOUT PLAN
- Drawing number(s)
- Date issued
- Electronic format: DXF or DWG

SB.05.06

SUBMISSION

The Consultant must submit A1 and A3 paper prints as well as a CD(s) of the Site Layout Plan(s) to the Project Manager before the Final Approval Certificate is signed.

The site layout plan(s) to be submit for approval within 12 months from the start of the contract. If not, a breakdown will be registered with related payment reduction.

The CD(s) must include the entire overlays/layering scheme and a compound drawing which includes all the services and information on one Site Layout Plan in DXF/DWG format.

During the Repair and Maintenance phase, the Project Manager will forward a request from time-to-time to the Consultants to prepare an A3 print(s) of the Site Layout Plan, which will be submitted as part of a report to Department of Public Works.

SB 06

MEASUREMENT AND PAYMENT

SB 06.01

Compile and supply a complete set of Operating and Maintenance ManualsUnit : 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.

SB 06.02

Compile and supply a complete site layout plan.....Unit : sum

The unit of measurement shall be a sum for the complete set (three A1-size copies for each plan) and electronic format of the site layout plan(s).

The tendered sum shall include full compensation for all expenses such as paper, copy work and printing required for the completion of the site layout plan.

The site layout plan(s) to be submit for approval within 12 months from the start of the contract.
If not, a breakdown will be registered with related payment reduction.

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 OF 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 13	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 The Scope of Work.

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 installations, as well as recommissioning work that is part of the routine preventive and corrective maintenance.

SC 01.01 **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.

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 recommissioning of that part.

Each part of an installation 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, brackets, electrical cables and any other temporary equipment and materials to provide a functional link between each repaired and upgraded part of the installation and the parts 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 PLAN

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 plan. This plan 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 Contractor submits the detailed commissioning plan for approval by both the Engineer and the User Client. Commissioning plans shall take all process requirements into account. The detailed commissioning plan shall indicate all actions necessary for:

- (1) Decommissioning
- (2) Recommissioning of parts of the installation
- (3) Commissioning of the installation.

All work deemed necessary for practical completion of the installation shall be indicated on the commissioning plan.

The plan includes a detailed programme which 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 or shutdown.

The following specific actions shall be included in the detailed 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 spools blanked flanges, electrical cables, temporary equipment and materials 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, electrical and communication cable termination and all other work necessary for recommissioning;
- (e) Installation of temporary functional links between any two parts of the installation;
- (f) Each individual field weld, connections and terminations 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) Detailed tests to confirm the performance of specific equipment, including calibration of all instruments;
- (j) Installation and connection of all power and communication cables;
- (k) De-aeration of all pipe sections;
- (l) Communication between the Contractor, the Engineer, the Employer and the User Client;
- (m) Start-up of the complete system, indicating start-up procedures.

Inspection of the prefabricated installation, testing of all equipment and materials prior to final commissioning, pressure testing and non-destructive testing shall be clearly scheduled in the project progress programme.

The detailed commissioning plan clearly indicates the responsible technical staff, with their relevant qualifications and trade skills against each of the tasks on the programme.

The detailed commissioning plan also indicates the methodology for testing, calibration and certifying functional compliance for each component forming part of the installation.

Day 30 tests and instruction/training sessions with the User Client shall be scheduled in the project progress programme.

The Contractor shall submit commissioning checks sheets to the Engineer 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.

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.

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 Agent
Engineer:	Engineer Representative
Employer:	Representative of Area Manager
User Client:	Operating and Maintenance Manager.

SC 05

COMMISSIONING RISK CONTROL AND PENALTIES

- (a) The safety instructions stipulated by the Occupational Health and Safety Act 85 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.
- (c) Payment reductions for exceeding the maximum permissible down-time during shutdown and commissioning shall apply as stipulated in the General Conditions of Contract and the Contract Data.

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 bidders shall make allowances in their bid 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 pre-commissioning tests and checks shall be agreed with the Engineer prior to commencement, as scheduled in the Detailed Commissioning Plan.
- (b) The Contractor shall first conduct his own tests of all the equipment and individual components forming part of an installation. When he is satisfied that the equipment complies with the specifications, he shall notify the Engineer that he is ready for the official pre-commissioning 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 or pipes sumps, the Contractor shall clean out the tanks, pipes, fittings, equipment or structures and, if necessary, make arrangements with other Contractors to remove their building rubble from the structures, check that all safety devices and alarms have been set and activated, all nuts have been tightened correctly, that all the equipment is complete and ready for start-up, that the plant has been installed correctly, and that 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, pre-commissioning functionality 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.

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 shut-down 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 installation 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 General Conditions of Contract and the Contract Data 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(s) to perform in perfect working order.

- (a) The commissioning period for each installation:
 - (i) Commences with the Day 1 tests of the complete repaired and upgraded installation;
 - (ii) Includes commissioning of all components, equipment, sections and sub-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;
- (c) Complete commissioning of installations as part of the system as a whole 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 commissioning tests:
 - (i) The Contractor shall be entitled to a certificate of Practical Completion for the repairs and upgrading of the installation only upon successful completion of the Day 30 commissioning tests;
 - (ii) The Contractor becomes responsible for maintenance of the installation upon Practical Completion and is entitled to performance-based payments in compliance with Additional Specification SA: General Maintenance, until Project Completion.
- (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 bid 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. 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.
- (f) Commissioning of a system (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, manual controls and human interventions and all 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.
- (g) 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.
- (h) The Contractor shall provide weekly updates of the detailed commissioning programme and schedule.

- (i) It shall be an express Condition of the Contract 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.

SC 12 **MEASUREMENT AND PAYMENT**

SC 12.01 **DECOMMISSIONING AND REMOVING INSTALLATIONS AS PART OF THE SYSTEM**..... Unit: sum

The unit of measurement shall be a sum.

The sum bid 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 installations as listed in the Bill of Quantities.

The sum bid shall include full compensation for the decommissioning and removal of the parts and components of an installation as listed individually in the Bill 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 sum bid 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 AN INSTALLATION**..... Unit: sum

The unit of measurement shall be a sum.

The sum bid 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.

Separate payment items shall be billed for separate installation as part of the system.

SC 12.03 **COMMISSIONING AND TESTING OF INSTALLATIONS AS PART OF SYSTEMS AS A WHOLE**..... Unit: sum

The unit of measurement shall be a sum.

The bid sum shall include full compensation for commissioning of the installations specified and listed as part of the system as a whole and for all costs and expenses related to labour, removal, repair, reinstallation and testing of material components and equipment during the commissioning period for each part of the system. The bid sum shall include full compensation for the final commissioning and testing, including Day 1 and Day 30 tests and all work during the 30 day commissioning period of all parts and components of the system to the specified functional condition.

All work, handling of temporary live electrical cables, lock-out and tag out procedures, temporary diversion of flows and all safety requirements shall be included in the bid sum. All actions for on-site testing, sampling, analysis, logging of data and recording of results shall be covered under the costs

for commissioning. The contractor shall also be responsible for assisting the client with operation of the system during the commissioning period, all related costs deemed included with the bid sum.

Payment shall be based on successful completion of the Day 30 tests.

ADDITIONAL SPECIFICATION

SI OCCUPATIONAL HEALTH AND SAFETY

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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 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.

Signature Client H&S: _____

Signature: Principal Contractor: _____

Date: _____

Date: _____

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 corrective maintenance work is included at Goldfields The items allowed for in the scope of works will only be executed upon instruction from the Engineer when so required and when necessary.

General Items

Description of repair work: General Items

Roofs

The entire roof will be pressure washed to remove existing dirt and cleaning surfaces with an approved degreaser and rinsing thereof. The roof will then be inspected and repaired as needed by supplying and fixing new screws and sealants or sealer strips.

The roof will then receive one new primer coat and one coat dual pack poly-urethane enamel system with acrylic finish roof paint.

An allowance has been made for the replacement of damaged roof sheeting.

Gutters and Downpipes

The building currently has seamless gutters with downpipes. All these gutters and downpipes are to be pressure cleaned. There is an allowance made to replaced damaged gutters and downpipes.

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External Facade

All external face brick walls will be scrubbed down with sugar soap, rinsed thoroughly with clean water and sealed with an approved brick sealant.

All other external surfaces that have been plastered will have the cracks repaired and will be repainted.

Floor Covering

There is a variety of internal floor coverings such as vinyl, wooden tongue and groove planks and carpet in the building.

Lecture Room 1 has wooden flooring which will be removed. A 25mm screed will be cast above the existing concrete floor and the installation of a stone plastic composite vinyl flooring.

Lecture Room 2 has two types of floors covering namely vinyl tiles and wooden planks. The existing vinyl floor coverings are in a poor state and will be replaced with stone plastic composite vinyl flooring.

The wooden flooring will be varnished and damaged areas will be repaired in sections.

All the bathrooms and Passageways (1 ,2, 3, 6 and foyer) have a brick exposed type of flooring that will be cleaned and sealed with three coats of brick dressing.

The Laboratory and Passage 7 has vinyl floor tiles that will be replaced with full body porcelain tiles.

The Offices, Library, Passage 4 and Passage 7 have carpet tiles coverings that will be removed to expose the original wooden flooring. The wooden flooring will be sanded down and three coats of polyurethane varnish with light sanding between coats will be applied.

Paintwork

The internal walls, ceilings and windows will be painted. The existing surfaces will be cleaned, all loose material will be removed and cracks filled before painting commences.

All plastered wall surfaces will be prepared and all loose material to be removed, application of one coat of primer and two coats polyurethane Alkyd enamel paint.

The painting of steel surfaces such as containers, door frames and rails shall be washed down with a degreaser and rinsed with water. The area will be allowed to dry and then one coat of primer to be applied and two coats polyurethane enamel paint.

Fibre cement surfaces around the building will be prepared and all loose material to be removed, application of one coat of plaster primer and two coats of polyurethane enamel paint.

Timber surfaces such as doors, cupboards, skirtings, floors and overhangs will be varnished. The timber will be cleaned and holes filled. The timber will be sanded down and three coats of polyurethane varnish with light sanding between coats will be applied.

Fairface brickwork in the garages will be prepared and all loose material to be removed, application of one coat of primer and two coats polyurethane Alkyd enamel paint.

The external manholes will be cleaned and an Alkali resistant solvent based paint will be applied.

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A polyurethane sealant will be installed in all expansion joints.

Joinery

The cupboards have been damaged by water or fair wear and tear. All the damaged cupboards will be replaced with cupboards manufactured from Bison "A" grade board with high impact edging and 32mm thick "post-form" top. The backing will be 5mm white hardboard, whilst doors are 16mm thick with 10mm dia x 190mm stainless steel bar handles and a Ceasarstone Quartz countertop.

Kitchen cupboards will only be replaced in the kitchen, Lecture Room 1 and Lecture Room 2. All the other cupboards that will not be replaced will be refurbished (Library, Laboratory and Offices). The refurbished cupboards countertops will be replaced with a new Ceasarstone Quartz countertop.

Damaged shelving will also be replaced as required.

The existing curtain rails will be removed and venetian vertical blinds will be installed in all the offices, Lecture Rooms 1 and 2, Laboratory Bathroom 1, Bathroom 2, Bathroom 3, Bathroom 4, Bathroom 5, Storeroom 2 and Storeroom 3. This will be used to control the amount of natural light entering the rooms.

Ironmongery

In Laboratory and Lecture Room 2 along the disabled ramps a 1 meter high handrail will be installed to ensure the ramp is compliant with SANS 10400.

A new 32mm diameter stainless steel cistern back rail and dog leg side grab rail will be installed in each disabled bathroom and the old grab rails to be removed.

SA Pine shelving 250 x 22mm thick will be fixed on to one side of the Library wall with adjustable wall band at approximately 500mm centres, to provide additional storage for books.

All the bathroom doors will receive new indicator locks and as specialized disabled indicator lock with aluminium handles will be installed at all the disabled bathrooms.

Damaged internal door handles will be replaced with a two-lever lockset with chrome handles and a set of keys.

A 450 x 600 x 6mm thick mirror will be installed above each wash hand basin in the bathrooms. All bathroom standard arm closers will be replaced with new.

Walls

The bathroom wall tiles will be removed and new full body porcelain wall tiles will be installed.

The shower walls and floors will be waterproofed with an approved cementitious water proofing system to prevent water damage to the rear end of the wall. The shower walls and floor will receive one coat of waterproof slurry primer coat, one layer of fabric soaked in slurry and two final coats of slurry.

The existing kitchen splash back tiles are to be removed and new full body porcelain tiles are to be installed.

The existing waste pipes are wall mounted. Prior to the tiling of the bathroom walls the contractor will chase all exposed pipework into the walls.

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A one brick skin wall will be built in the bathrooms where the Geberit system will be installed.

Windows and Doors

All doors will be assessed to determine not only their general condition, but also the condition of hinges and handles etc. Any unsuitable or damaged doors and door frames will be replaced.

Damaged internal doors to be replaced with a semi-solid core flush panel door that is 40mm thick with meranti veneer on both sides. Damaged external doors to be replaced with a solid laminated door that is 40mm thick with meranti veneer on both sides.

All doors will be serviced to ensure it is in a fully functional state. The servicing will include repairing as necessary any defective or missing parts and ensure that the door is correctly aligned to open and close properly.

All cracked or broken glazing will be replaced with 4mm thick obscure glass in the bathrooms and clear glass in all the other rooms one metre above final floor level. Safety glass will be installed in glass panes that are required within one meter of the floor level such as glazed entrance doors.

Three new natural anodised aluminium double doors, glazed with 6,38mm clear laminated safety glass and sealed with silicone sealant will be installed at the exit in Passage 5, Laboratory and Lecture Room 2.

The glass windowpanes between the Laboratory and the Lecture Room 1 will be replaced with new windowpanes with a mural printed on it as per the clients requirements.

The existing steel windows will be replaced with aluminium double layered windowpanes

Ceilings

In the Laboratory, Library, Lecture Room 1 and Lecture Room 2 new mineral fibre acoustic suspended ceiling 600 x 600 x 15mm thick tiles with 2,5mm wire hangers will be installed. The main tees will be suspended at 1200mm centres by means of a pre-straightened 2,5mm diameter galvanised wire fixed through holes in main tee and hung from steel purlins with purlin clips to the underside of the 80 x 80 x 8mm thick L angle. Both ends of wire hangers to be twisted three times. Installation to be in accordance with CAPCO and SABISA installation instructions.

In Passageway 4 and 5 the existing damaged 1200 x 600mm ceiling tiles will be removed and replaced with new mineral fibre acoustic suspended ceiling 600 x 600 x 15mm thick tiles 2,5mm thick wire hangers.

Lecture Room 1 will have an electronic project screen 2440 x 2440mm installed which will retract into the projector screen ceiling box fixed into the suspended ceiling.

The mounting bracket for the projector will be replaced with a new 430 x 650mm ceiling mounted bracket.

Signage and White Boards

The old bulletin boards and green boards found in the passageways and Lecture Rooms will be removed and replaced with new aluminium frame bulletin boards and anodised aluminium frame white board with pen tray fixed to the wall.

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Dilapidated Male, Female and disabled bathroom signages will be removed and new signage to be installed.

Plumbing and Drainage

The existing geyser system can be replaced or supplemented by the same heating system used for the office heating or equipped with heat pumps. Further green building technologies include replacing all the existing conventional water fixtures with water saving fixtures.

All the bathrooms where alterations take place will receive new sanitary fixtures. The following work is planned:

- Removal of all existing cisterns and pans in the bathrooms and installation of a Geberit Sigma concealed cistern with WC pan.
- Remove the wash hand basins in Bathrooms 1, 2, 3 and 5 and install new floating Granite tops with mixer taps.
- Removal of all existing urinals and installation of new waterless urinals.
- Install support cistern rail and angle side in the Disabled Bathroom.
- Each bathroom to receive a Franke Rodan 0,8mm thick satin finish stainless steel paper towel and soap dispenser.
- Replace porcelain sinks in classrooms with stainless steel sinks with Cobra single lever raised chrome basin mixer.
- Service all taps and mixer units that will not be replaced.
- Removal of existing shower heads and under tile taps to be replaced with water saving showerheads.
- Exposed PVC waste pipes to be chased into wall.
- Damaged copper and PVC piping to be replaced.
- In Bathrooms 3 and 5 new Laufen Save! Urine wall hung separation WC will be installed.

The urine from the waterless urinals and urine separating toilets in bathroom 3 and bathroom 5 will be separated from the solid waste. The undiluted urine will be collected in a 1.25m³ underground tank located next to Bathroom 5. The underground tank will have an outflow which allow for the urine to flow into the sewer system to reunite with the solid waste. This allows for urine samples to be taken from the tank while the urine is still removed as part of the sewer system. The underground tank will be covered in soil and the top access will be closed with a cap and a 0.9 x 0.9m manhole cover installed.

Structural

The overall structural condition of the building is good, with minor items to be fixed. The roof generates a periodic noise due to thermal expansion and roof joint movement from the insulation board connected

directly underneath the Kliplok roof sheeting. The insulation will be removed from the underside of the roof sheeting in the Lecture Rooms, Laboratory and Library to prevent noise generation. In the Laboratory, Library, Lecture Room 1 and Lecture Room 2 the existing isoboard that's fixed to the underside of the roof sheeting will be removed and stored for later re-use. The stored isoboard will then be supported by straining wire fixed to the bottom chord steel.

Firefighting

All existing fire extinguishers will be serviced, cleaned, and repaired according to the manufacturer's specification. Photo luminescent escape and fire fighting equipment signs will also be installed.

Additional 9kg Dry chemical powder (STP) and 5kg CO₂ fire extinguishers will be installed. A 314 stainless steel lockable metal cabinet will also be installed.

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Date: _____

Firehose reels and smoke detectors will be installed to supplement the existing firefighting equipment. Firefighting training will be implemented within the contract as well as the compilation of a fire plan for the building.

Civil Work

The following will be executed improve the surface draining around the building:

- All the concrete paving blocks will be removed and replaced with 200 x 200 x 70mm thick fine exposed aggregate non-slip pavers. Concrete edgings (E1) will be installed along the edges of the paving to prevent movement of the paving. The paving will be installed to accommodate the flow of stormwater and to direct the stormwater runoff into the rainwater channels.
- New pavers will also be installed at the north side of the building where the concrete floor slab is present.
- The vegetative growth between the masonry pavers will be removed.
- The damaged manhole covers to be replaced and all manhole covers to be painted.
- All damaged rainwater channels to be replaced and where it is possible move the rainwater channel away from the building.
- Clean all manholes, grid inlets and rainwater channels to ensure stormwater is channelled efficiently towards stormwater manholes.
- The unblocking and cleaning of 50mm and 100mm dia pipelines will also be executed to prevent future blockages.
- Replaced damaged gulley with a concrete gulley.
- The wheelchair ramp on the North side will be lifted, and a 110mm subsoil drainage pipe will be installed. The water collected by the new subsoil drain will drain into the nearest rainwater channel.
- Terraforce blocks will be used for the wall construction with a concrete footing. The design features a vertical wall height of 2.5m footing of 300mm thickness and 0.7m cross sectional width at the highest point with the wall sloping along the existing embankment profile. A subsoil drain will be installed on the uphill side of retaining wall with weeping holes to prevent water build up behind the retaining wall.

Electrical

The following work is planned under the electrical repair work:

- The light fixtures will be replaced as per drawing 0534-03-02.
- Service existing distribution board, labelling and provide legend card. Replacement of old Fuchs type circuit breakers. Install additional circuit breakers for power circuits to the hand dryers and other fixed equipment.
- Provide Certificate of Compliance on the Electrical Installation
- Supply and install new separate power supplies to the hand dryers in the ablutions. Power supply will be complete with conduit and PVC wiring. Hand Dryers currently work from light switches and socket outlets.
- Replace the existing power supply on the outside of the building to the outside lights that is in PVC trucking with PVC conduit complete with draw boxes and round boxes.
- Install a light switch for the library as the light switch is located in the passage.
- Supply and install power skirting complete with socket outlets above the work tops in the classrooms.
- Replace the existing old light switches and rusted light switch covers. The lights switches will furthermore be serviced and labelled.
- Replacement of socket outlets with single euro sockets as per latest SANS 10142 regulations.
- All socket outlets, light switches and isolators will be labelled with PVC brother labels according to the circuit number in the D.B Board (C.B 10 DB A)
- Replacement of defective light fittings, lamps and control gear. Defective light fittings to be replaced with LED type lights to minimize maintenance and to save on energy consumption.
- Supply and install 600x600mm panel LED lights at the new suspended ceilings in the classrooms.

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- Supply and install power supply complete with 6A USO sockets for new LED panel lights that will be installed in the classrooms.
- Check and repair earthing and bonding of the building and at all the ablutions, geysers, heat pumps and equipment.
- Install LED strip lights underneath the cupboards to provide lightning at the worktops in the classrooms.
- Replacement of the outside lights with LED lights that with directional reflectors to minimize light pollution.
- Add additional outside lights on certain places around the building for security purposes.

Photovoltaic System

A new Photovoltaic (PV) system with changeover and battery backup can be installed in the parking area of the Goldfields building. The PV system will empower the building to be less dependent on the city power grid with the battery backup making up for any shortfall of power during power interruptions on the main grid. A new PV system will be installed with 44x 365W new solar panels which can generate up to 77kWh/d. The solar panels will be installed on a new carport structure

HVAC

A fresh air supply unit to supply constant air flow of 500m³/h of heated filtered air to be installed.

Pest Control

A provisional amount has been allocated for pest control to be executed at the building.

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

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- 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.

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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.
 -

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- 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

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Date: _____

- 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.

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-
- 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

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Date: _____

- 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 contractor 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 any 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.

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- 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.

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Date: _____

- 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) (<i>10(e) only applicable to Contractor's yards</i>)
• Grinding wheels	• Driven Machinery Regulation 8(1)(7)

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Date: _____

• Machinery	• General Machinery Regulation 9 (<i>Schedule D</i>)
• 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

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Date: _____

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

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- 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.

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SI 4.10.2 Other assessments and inspections by the Client

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- 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.

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SI 4.10.6 Recording and review of inspection results

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- 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.

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Date: _____

Date: _____

-
- 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**

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- 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.

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Date: _____

-
- 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

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SI 5.1 EMERGENCY PREPAREDNESS, CONTINGENCY PLANNING AND RESPONSE

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- 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.

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SI 5.2 FIRST-AID

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- 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.

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- 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.

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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)

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Date: _____

- | | |
|----------------------|----------|
| ▪ 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

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Date: _____

- 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.

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-
- 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*”

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- 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

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- 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

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- 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.

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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

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Date: _____

- 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

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- 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

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- 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

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Date: _____

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

Signature Client H&S: _____

Signature: Principal Contractor: _____

Date: _____

Date: _____

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.

Signature Client H&S: _____

Signature: Principal Contractor: _____

Date: _____

Date: _____

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

Signature Client H&S: _____

Signature: Principal Contractor: _____

Date: _____

Date: _____

- 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

Signature Client H&S: _____

Signature: Principal Contractor: _____

Date: _____

Date: _____

- 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

Signature Client H&S: _____

Signature: Principal Contractor: _____

Date: _____

Date: _____

- 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 it 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 45°
- 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 be appointed.

The area where Piling Driving Operation is to be done will be barricaded. The necessary signs will be promptly displayed.

Signature Client H&S: _____

Signature: Principal Contractor: _____

Date: _____

Date: _____

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:

- Working hours: Monday – Friday before 07:00 or after 18:00 on any day other than those days contemplated in subparagraphs ii and iii.
 - Saturdays: before 07:00 or after 15:00.
 - 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 ORANOGRAM

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.

Signature Client H&S: _____

Signature: Principal Contractor: _____

Date: _____

Date: _____

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

Signature Client H&S: _____

Signature: Principal Contractor: _____

Date: _____

Date: _____

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

Signature Client H&S: _____

Signature: Principal Contractor: _____

Date: _____

Date: _____

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 MANDATORY AGREEMENT BETWEEN CLIENT AND PRINCIPAL CONTRACTOR

Signature Client H&S: _____

Signature: Principal Contractor: _____

Date: _____

Date: _____

**OCCUPATIONAL HEALTH & SAFETY ACT 85 of 1993
CONSTRUCTION REGULATIONS 2014**

AGREEMENT WITH MANDATARY

In terms of Section 37(1) & (2)

WRITTEN AGREEMENT ENTERED INTO AND BETWEEN

(Hereinafter referred to as Client)

AND

(PRINCIPAL CONTRACTOR)

Signature Client H&S: _____

Date: _____

Signature: Principal Contractor: _____

Date: _____

AGREEMENT WITH MANDATORY 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 Mandatory" 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

(Companyss/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: _____

Mandatory-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: _____

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract

Contract: **SANBI G550/2025**

ACCEPTANCE OF APPOINTMENT

I, _____ Designation: _____
(Principal Contractor)

hereby accept the requirements of this appointment.

Signature: _____

Date: _____

Signature Client H&S: _____

Date: _____

Signature: Principal Contractor: _____

Date: _____

South African National Biodiversity Institute

Requests for bids for the appointment of a contractor for the renovation work to the Goldfields Education Centre for the South African National Biodiversity Institute at the Kirstenbosch National Botanical Garden, Cape Town: Completion Contract
Contract: **SANBI G550/2025**

ANNEXURE B: DRAWINGS

DRAWING TITLE	DRAWING NUMBER
GOLDFIELDS BUILDING LAYOUT	0534-01-01
CEILING LAYOUT PLAN	0534-02-02
WASH HAND BASIN DETAIL	0534-02-03
PV POWER SYSTEM	0534-03-03
MAIN DISTRIBUTION BOARD	0534-03-04
BUILDING DISTRIBUTION BOARD	0534-03-05
HEATING, VENTILATION AND AIRCONDITIONING	0534-06-01