

May 2023



BID NO.: EKZWN 18/2022/23

**New 2 x 6 Bed Staff Accommodation units at
Mpila Camp Imfolozi Game Reserve**

BID DOCUMENT

CIDB Grading: 5GB or Higher

Name of Bidder: _____
Telephone No: _____
Fax No: _____
Address: _____

Bid Sum R _____

Bid Closes On 31 MAY 2023 AT 11:00

QUANTITY SURVEYOR:

ROBERT CONSULTING
20 STAPLETON ROAD
PINETOWN
3610
Tel: 031 708 4001/2
Fax: 086 689 1174

EMPLOYER:

EZEMVELO KZN WILDLIFE
NO. 01 PETER BROWN DRIVE
MONTROSE
3201
Tel: 033 845 1914
Fax: 033 394 9046



INVITATION TO BID

BID NUMBER:	EKZNW18/2022/23
DESCRIPTION OF WORK REQUIRED:	New 2 x 6 Bed Staff Accommodation units at Mpila Camp Imfolozi Game Reserve
CIDB GRADE	CIDB Grade – 5GB or Higher
COMPULSORY BRIEFING SESSION DATE & ADDRESS:	<p>Date: 18 May 2023</p> <p>Time: 10h30</p> <p>Venue: Nyalazi Gate – Imfolozi Game Reserve - KZN.</p> <p>Note1: Bidders are to ensure that they have signed in at the gate and park inside before 10h30. An Ezemvelo Official will then lead the convoy to the site.</p> <p>Note 2: Bidders are to download and bring completed printed documents with them to site so that the “OFFICIAL BRIEFING SESSION/SITE INSPECTION CERTIFICATE” (page 5) can be signed and stamped on site.</p>
CLOSING DATE AND TIME:	31 May 2023 11:00am
BID VALIDITY PERIOD:	120 calendar days (commencing from the Closing Date)
BID DOCUMENTS DELIVERY ADDRESS:	Ezemvelo KZN Wildlife, Head Office Queen Elizabeth Park No. 1 Peter Brown Drive Montrose, Pietermaritzburg 3202

NAME OF BIDDER:	
BID PRICE IN RSA CURRENCY WITH ALL APPLICABLE TAXES INCLUDED:	R
BID PRICE IN WORDS:	..... ..... .....
BIDDERS SIGNATURE:	

TABLE OF CONTENT

PART A		Page No:
	Special instructions and notices to bidders regarding the completion of bidding forms	3
	Registration on the Central Suppliers Database	4
	Official Briefing Session /Site Inspection Certificate	5
	SBD 1: Invitation to Bid	6-7
	SBD 4: Bidder's disclosure	8-9
	SBD 6.1: Preference points claim form in terms of the preferential procurement regulations 2022	10-13
PART B		
	Special conditions of Contract	14-17
	Authority of sign a bid	18
	General Conditions of Bid	19-22
	Contractor's Health And Safety Declaration	23-24
	Pre-Construction Health And Safety Specification	25-39
	Environmental Management Plan (Emp)	40-45
	Contractor Standing Orders	46-49
PART C		
	C1.1 CONTRACT DATA	51-80
	C1.2 FORM OF GUARANTEE	81-85
	C2.1 PRICING INSTRUCTIONS	87-90
	C3.1 Bill of Quantities: Preliminaries	P1-P42
	C3.2 Bill of Quantities: Building Works	1 – BW1
	C3.3 Bill of Quantities: External Works	70-EW1
	C3.4 Bill of Quantities: Electrical Works	95-E1
	C3.5 Final Summary Page	FS1
PART D		
	D1.1 Architectural Drawings	4 Pages
	D1.2 Electrical Drawings	4 Pages
	D1.3 Civil and Structural Drawings	6 Pages
	D2.1 Building Specifications	79 Pages
	D2.2 Electrical Specifications	58 Pages
	D2.3 Geotechnical Report	17 Pages

PART A

SPECIAL INSTRUCTIONS AND NOTICES TO BIDDERS REGARDING THE COMPLETION OF BIDDING FORMS

PLEASE NOTE THAT THIS BID IS SUBJECT TO TREASURY REGULATIONS 16A ISSUED IN TERMS OF THE PUBLIC FINANCE MANAGEMENT ACT, 1999, THE KWAZULU-NATAL SUPPLY CHAIN MANAGEMENT POLICY FRAMEWORK, EZEMVELO KZN WILDLIFE SUPPLY CHAIN MANAGEMENT POLICY AND ALL OTHER PRESCRIPTS THAT REGULATE PUBLIC PROCUREMENT IN THE REPUBLIC OF SOUTH AFRICA.

1. Unless inconsistent with or expressly indicated otherwise by the context, the singular shall include the plural and visa versa and with words importing the masculine gender shall include the feminine and the neuter.
2. Under no circumstances whatsoever may the bid forms be retyped or redrafted. Photocopies of the original bid documentation may be used, but an original signature must appear on such photocopies.
3. The bidder is advised to check the number of pages and to satisfy himself that none are missing or duplicated.
4. Bids submitted must be accurately completed. Bidders must ensure that all questions are answered. If questioned are “not applicable”, bidders must ensure that “N/A” is indicated in the relevant space. It is not permissible to leave blank spaces or unanswered questions. Bidders will only be considered if the bid document is accurately completed and accompanied by all relevant certificates and other necessary applicable information. Original signature must appear on all relevant Sections of the bid document. Failure to comply with the same will invalidate your bid.
5. Bids shall be lodged at the address indicated not later than the closing time specified for their receipt, and in accordance with the directives in the bid documents.
6. Each bid shall be addressed in accordance with the directives in the bid documents and shall be lodged in a separate sealed envelope, with the name and address of the bidder, the bid number and closing date indicated on the envelope. The envelope shall not contain documents relating to any bid other than that shown on the envelope. If this provision is not complied with, such bids may be rejected as being invalid.
7. All bids received in sealed envelopes with the relevant bid numbers on the envelopes are kept unopened in safe custody until the closing time of the bids. Where, however, a bid is received open, it shall be sealed. If it is received without a bid number on the envelope, it shall be opened, the bid number ascertained, the envelope sealed and the bid number written on the envelope.
8. A specific box is provided for the receipt of bids, and no bid found in any other box or elsewhere subsequent to the closing date and time of bid will be considered.
9. No bid sent through the post will be considered if it is received after the closing date and time stipulated in the bid documentation, and proof of posting will not be accepted as proof of delivery.
10. No bid submitted by telefax, telegraphic or other electronic means will be considered.
11. Bidding documents must not be included in packages containing samples. Such bids may be rejected as being invalid.
12. Any alteration made by the bidder must be initialed and use of correcting fluid is prohibited.
13. Bids will be opened in public as soon as practicable after the closing time of bid.
14. Where practical, prices are made public at the time of opening bids.
15. If it is desired to make more than one offer against any individual item, such offers should be given on a photocopy of the page in question. Clear indication thereof must be stated on the schedules attached.
16. Bidders must ensure that during a briefing session, the certificate is stamped and signed, also ensure that the attendance register is signed. Failure to comply with any of these will result to disqualification.
17. Ezemvelo will not reimburse bidders for any expenses incurred in the preparation of the bids and submission of a bid offer, including the costs of any testing necessary to demonstrate that aspects of the offer satisfy requirements.
18. All bids must remain binding for a minimum period of (120) calendar days the date of the bid closing date.

REGISTRATION ON THE CENTRAL SUPPLIERS DATABASE

1. In terms of the National Treasury Instruction Note, all suppliers of goods and services to the State are required to register on the Central Suppliers Database.
2. Prospective suppliers should self-register on the CSD website www.csd.gov.za
3. If a business is registered on the Database and it is found subsequently that false or incorrect information has been supplied, then the Ezemvelo KZN Wildlife may, without prejudice to any other legal rights or remedies it may have;
 - 3.1 cancel a bid or a contract awarded to such supplier, and the supplier would become liable for any damages if a less favorable bid is accepted or less favorable arrangements are made.
4. **The same principles as set out in paragraph 3 above are applicable should the supplier fail to request updating of its information on the Central Suppliers Database, relating to changed particulars or circumstances.**
5. IF THE SUPPLIER IS NOT REGISTERED AT THE CLOSING TIME OF BID, THE SUPPLIER WILL BE DISQUALIFIED AT THE BID EVALUATION PROCESS.

THIS IS TO CERTIFY THAT I (name of bidder/authorized representative) , WHO

REPRESENTS (state name of bidder)CSD
Registration

Number.....

AM AWARE OF THE CONTENTS OF THE CENTRAL SUPPLIER DATABASE WITH RESPECT TO THE BIDDER'S DETAILS AND REGISTRATION INFORMATION, AND THAT THE SAID INFORMATION IS CORRECT AND UP TO DATE AS ON THE DATE OF SUBMITTING THIS BID.

AND I AM AWARE THAT INCORRECT OR OUTDATED INFORMATION MAY BE A CAUSE FOR DISQUALIFICATION OF THIS BID FROM THE BIDDING PROCESS, AND/OR POSSIBLE CANCELLATION OF THE CONTRACT THAT MAY BE AWARDED ON THE BASIS OF THIS BID.

.....
SIGNATURE OF BIDDER OR AUTHORISED REPRESENTATIVE

DATE:

OFFICIAL BRIEFING SESSION/SITE INSPECTION CERTIFICATE

DATE: 18 May 2023

BID No: EKZNW18/2022/23

Service: NEW 2 x 6 BED STAFF ACCOMMODATION UNITS AT MPILA CAMP IMFOLOZI GAME RESERVE

This is to certify that (bidder's representative name) _____

On behalf of (company name) _____

Visited and inspected the site on ___/___/_____ (date) and is therefore familiar with the circumstances and the scope of the service to be rendered.

Signature of Bidder or Authorized Representative
(PRINT NAME)

DATE: ___/___/_____

Name of Public Entity Representative
(PRINT NAME)

Official stamp with signature

**PART A
INVITATION TO BID**

YOU ARE HEREBY INVITED TO QUOTE FOR REQUIREMENTS OF THE EZEMVELO KZN WILDLIFE					
BID NUMBER:	EKZNW18/2022/23	CLOSING DATE:	31 May 2023	CLOSING TIME:	11:00
DESCRIPTION	NEW 2 x 6 BED STAFF ACCOMMODATION UNITS AT MPILA CAMP IMFOLOZI GAME RESERVE				
BID RESPONSE DOCUMENTS MUST BE DEPOSITED TO THE FOLLOWING ADDRESS:					
Ezemvelo KZN Wildlife, Head Office					
Queen Elizabeth Park					
No. 1 Peter Brown Drive, Montrose					
Pietermaritzburg, 3202					
BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO			TECHNICAL ENQUIRIES MAY BE DIRECTED TO:		
CONTACT PERSON	Snehlanhla Molefe		CONTACT PERSON	Glenn Harborth	
TELEPHONE NUMBER	033 845 1365		TELEPHONE NUMBER	033 845 1914	
FACSIMILE NUMBER			FACSIMILE NUMBER		
E-MAIL ADDRESS	molefes@kznwildlife.com		E-MAIL ADDRESS	Glenn.Harborth@kznwildlife.com	
SUPPLIER INFORMATION					
NAME OF BIDDER					
POSTAL ADDRESS					
STREET ADDRESS					
TELEPHONE NUMBER	CODE		NUMBER		
CELLPHONE NUMBER					
FACSIMILE NUMBER	CODE		NUMBER		
E-MAIL ADDRESS					
VAT REGISTRATION NUMBER					
SUPPLIER COMPLIANCE STATUS	TAX COMPLIANCE SYSTEM PIN:		OR	CENTRAL SUPPLIER DATABASE No:	MAAA
B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE	TICK APPLICABLE BOX] <input type="checkbox"/> Yes <input type="checkbox"/> No		B-BBEE STATUS LEVEL SWORN AFFIDAVIT	[TICK APPLICABLE BOX] <input type="checkbox"/> Yes <input type="checkbox"/> No	
[A B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE/ SWORN AFFIDAVIT (FOR EMES & QSEs) MUST BE SUBMITTED IN ORDER TO QUALIFY FOR PREFERENCE POINTS FOR B-BBEE]					
ARE YOU THE ACCREDITED REPRESENTATIVE IN SOUTH AFRICA FOR THE GOODS /SERVICES /WORKS OFFERED?	<input type="checkbox"/> Yes <input type="checkbox"/> No [IF YES ENCLOSE PROOF]		ARE YOU A FOREIGN BASED SUPPLIER FOR THE GOODS /SERVICES /WORKS OFFERED?	<input type="checkbox"/> Yes <input type="checkbox"/> No [IF YES, ANSWER THE QUESTIONNAIRE BELOW]	
QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS					
IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)?			<input type="checkbox"/> YES <input type="checkbox"/> NO		
DOES THE ENTITY HAVE A BRANCH IN THE RSA?			<input type="checkbox"/> YES <input type="checkbox"/> NO		
DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA?			<input type="checkbox"/> YES <input type="checkbox"/> NO		
DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA?			<input type="checkbox"/> YES <input type="checkbox"/> NO		
IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION?			<input type="checkbox"/> YES <input type="checkbox"/> NO		
IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER.3 BELOW.					

**PART B
TERMS AND CONDITIONS FOR BIDDING**

1. BID SUBMISSION:	
1.1.	BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.
1.2.	ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED–(NOT TO BE RE-TYPED) OR IN THE MANNER PRESCRIBED IN THE BID DOCUMENT.
1.3.	THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT, 2000 AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2022, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.
1.4.	THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT FORM (SBD7).
2. TAX COMPLIANCE REQUIREMENTS	
2.1	BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.
2.2	BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VERIFY THE TAXPAYER'S PROFILE AND TAX STATUS.
2.3	APPLICATION FOR TAX COMPLIANCE STATUS (TCS) PIN MAY BE MADE VIA E-FILING THROUGH THE SARS WEBSITE WWW.SARS.GOV.ZA.
2.4	BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.
2.5	IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.
2.6	WHERE NO TCS PIN IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.
2.7	NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE, COMPANIES WITH DIRECTORS WHO ARE PERSONS IN THE SERVICE OF THE STATE, OR CLOSE CORPORATIONS WITH MEMBERS PERSONS IN THE SERVICE OF THE STATE."

NB: FAILURE TO PROVIDE / OR COMPLY WITH ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.

SIGNATURE OF BIDDER:

CAPACITY UNDER WHICH THIS BID IS SIGNED:
(Proof of authority must be submitted e.g. company resolution)

DATE:

BIDDER'S DISCLOSURE

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.
- 3.5 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.
- 3.6 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.
- 3.7 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.

**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

(delete whichever is not applicable for this tender).

- a) The applicable preference point system for this tender is the **80/20** preference point system.
- b) **80/20 preference point system** will be applicable in this tender. The lowest/ 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:

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

Where

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

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

3.2.1. POINTS AWARDED FOR PRICE

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

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

Where

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

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.

80/20 preference point system is applicable, corresponding points must also be indicated as such.

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

The specific goals allocated points in terms of this tender	Number of points allocated (80/20 system) (To be completed by the organ of state)	Number of points claimed (80/20 system) (To be completed by the tenderer)
51% Black owned enterprise	08	
51% owned by Black people who are women	04	
51% owned by Black people who are youth	04	
Geographical Location (Enterprises located in Zululand or Umkhanyakude Districts)	04	

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:	.....

PART B

SPECIAL CONDITIONS OF CONTRACT

This bid is subject to the Preferential Procurement Policy Framework Act and the Preferential Procurement Regulations, 2022; the General Conditions of Contract (GCC) and the following applicable other Special Conditions of Contract.

The offers must remain valid for a period of 120 calendar days from the closing date of the submission of bids.

1. CONTRACT PERIOD

- 1.1. The contract shall be for the period of 10 months.

2. EVALUATION CRITERIA

The evaluation process will be conducted in phase as follows:

PHASE 1	PHASE 2	PHASE 3	PHASE 4
Compliance and Completeness Screening	Mandatory requirements	Functionality	Price and preference
Compliance and completeness of proposal per the set of bid conditions.	CIDB Grade – 5GB or higher	The threshold score for functionality, which tenderers will be eliminated from further consideration, is 70%	This bid will be evaluated on 80/20-point system.

2.1 Phase 1 : Compliance and completeness screening

- Bidders must be fully registered on the National Treasury Central Supplier Database (CSD) at the closing time of the bid.
- Bid documents must be properly received on the bid closing date and time specified on the invitation.
- Bidders must ensure compliance with their tax obligations. No tender may be awarded to any tenderer whose tax matters have not been declared by the SARS to be in order.
- In bids where consortia / joint ventures / sub-contractors are involved; each party must submit a separate TCS
- Bid documents must be properly fully completed, dated, signed in ink, and initial every page of the bid.

2.2 Phase 2: Mandatory requirements

- Bidders must have CIDB grade **5GB** or higher.

2.3 Phase 3: Functionality Criteria

The threshold score, below which tenderers are eliminated from further consideration, is 70%

TENDER EVALUATION CRITERIA AND SCORING

The weighting for Functionality 70 out of 100 sub-points is as follows:

Evaluation Criteria		Deliverables	Points	Sub-Points		Sub-Criteria	
1,	Financial Standing		40	Points			
	Tenderer to demonstrate their financial capacity in order to undertake the project	Latest 3 month stamped bank statement as proof of working capital	30	30 of 30	Sub-points	Proof of working capital of at least 10% of project value	
				20 of 30	Sub-points	Proof to cover working capital of at least 5% of project value	
				10 of 30	Sub-points	Proof to cover working capital of at least 2,5% of project value	
		AND	Signed and dated Bank verification code letter	10	10 of 10	Sub-	Proof of signed Bank verification code rated A
					5 of 10	Sub-	Proof of signed Bank verification code rated B
					2 of 10	Sub-	Proof of signed Bank verification code rated C
2	Competency, Experience and Resource Capacity		30	Points			
	Tenderer to demonstrate their competency and capacity to undertake the project	List of 5 or more projects of R 4,5 million or higher within the last 5 years. List per project must be supported by signed letters of appointments, Practical completion certificate and Final completion certificate signed by the awarding institution	30	30 of 30	Sub-points	5 Sets of documents	
				15 of 30	Sub-points	3 Sets of documents	
				10 of 30	Sub-points	1 Set of documents	
		Reference letter from the institution for all the above listed projects stating the tenderers. workmanship, technical skills, time/programme management					

3	Tenderer's Project Management Structure and Organogram and Experience of Resources Proposed for the Project	30	Points					
<p>Demonstration of the tenderer's human resource capacity and technical competency for the project</p> <ul style="list-style-type: none"> - Contracts Manager - Site foreman - Safety officer <p>Detailed proposed project team organogram that sets out the roles and responsibilities of each proposed team member, which is backed up by their curriculum vitae; demonstrating extensive experience in projects in the Built environment.</p>		<p>Contracts Manager:</p> <ul style="list-style-type: none"> • relevant qualification • minimum 5 years of experience • minimum of 3 contactable references 	10	3	Sub-points	NQF level 6 qualification in the built environment		
				4	Sub-points	2-3 years =2 points 3-4 years =3 points 5 years = 4 points		
				3	Sub-points	Contactable references 1 point will be allocated per contactable reference up to a maximum of 3 points		
				<p>Site Foreman</p> <ul style="list-style-type: none"> •relevant qualification •minimum 5 years of experience •minimum of 3 contactable references 	10	3	Sub-points	NQF level 4 qualification.
						4	Sub-points	2-3 years =2 points 3-4 years =3 points 5 years = 4 points
						3	Sub-points	Contactable references 1 point will be allocated per contactable reference up to a maximum of 3 points
				<p>Safety Officer</p> <ul style="list-style-type: none"> • Relevant qualification • minimum of 5 years' experience • minimum of 3 contact 	10	3		NQF level 5 qualification in the built environment
						4		2-3 years =2 points 3-4 years =3 points 5 years = 4 points
						3		Contactable references 1 point will be allocated per contactable reference up to a maximum of 3 points.
		TOTAL		100				

2.3 Phase 4: Price and Preference goals

This bid will be valued using the 80/20-point system.

The specific goals allocated points in terms of this tender	Documents to be submitted by bidders to claim points.
51% Black owned enterprise	<p>Proof of B-BBEE status level of contributor and completed SBD 6.1.</p> <p>In the case of B-BBEE certificates, the bidder must also submit the full verification report which shows the percentage of Black ownership.</p>
51% owned by Black people who are women	<p>Proof of B-BBEE status level of contributor and completed SBD 6.1.</p> <p>In the case of B-BBEE certificates, the bidder must also submit the full verification report which shows the percentage of Black women or Black Youth ownership.</p>
51% owned by Black people who are youth	
Geographical Location (Enterprises located in Zululand & Umkhanyakude Districts)	<p>Utility bill/letter from the ward councilor/ lease agreement and completed SBD 6.1</p>

AUTHORITY TO SIGN A BID

The bidder must indicate the enterprise status by signing the appropriate box hereunder.

(I) CLOSE CORPORATION	(II) COMPANIES	(III) SOLE PROPRIETOR	(IV) PARTNERSHIP	(V) CO-OPERATIVE	(VI) JOINT VENTURE / CONSORTIUM	
					Incorporated	
					Unincorporated	

I/We, the undersigned, being the Member(s) of Cooperative/ Sole Owner (Sole Proprietor)/ Close Corporation/ Partners (Partnership)/ Company (Representative) or Lead Partner (Joint Venture / Consortium), in the enterprise trading as:

.....

hereby authorise Mr/Mrs/Ms

acting in the capacity of

whose signature is

to sign all documents in connection with this bid and any contract resulting therefrom on behalf of the enterprise.

NAME	ADDRESS	SIGNATURE	DATE

(if the space provided is not enough please list all the director in the resolution letter)

Note:

The following document must be attached to this form according to the status of the enterprise, in the form of a resolution authorising the signatory to sign all documents in connection with this bid and any contract resulting therefrom on behalf of the enterprise, and **such resolution shall include a specimen signature of the signatory.**

- Co-operative: Resolution letter from the directors
- Close Corporation: Resolution letter from the directors
- Company: Resolution letter from the director/s
- Sole Proprietor: Resolution letter from the director
- Partnership: Resolution letter from the director
- Joint Venture / Consortium: Resolution/agreement passed/reached' signed by the authorised representatives of the enterprises

Note: Director/s may appoint themselves if they will be the one signing all documents in connection with this bid and any contract resulting therefrom on behalf of the enterprise.

Failure to complete, sign and date this form or failure to provide the certificate(s) in the form of a resolution as described above shall result in the tender being considered non-responsive and rejected.

GENERAL CONDITIONS OF BID

Unless inconsistent with or expressly indicated otherwise by the context, the singular shall include the plural and vice versa and words importing the masculine gender shall include the feminine and the neuter.

1. Definitions and Interpretations

- 1.1 "Employer" shall mean The KwaZulu Natal Nature Conservation Board (Herein after referred to as the Board)
- 1.2 Employer's representative shall be: - Mr. Glenn Harborth – Technical Services Unit, Telephone No. - (033) 845 1914.

2. Issuing of Documents and Cost of Bidding

The Employer will not reimburse bidders for any expenses incurred in the preparation of the bids and submission of a bid offer, including the costs of any testing necessary to demonstrate that aspects of the offer satisfy requirements.

3. Bid validity period

Unless a longer period is stipulated, all bids must remain binding for a minimum period of (120) calendar days the date of the bid closing date.

4. Submission of Bids

The bid shall be signed by a person duly authorized to do so. Bids submitted by Joint Ventures of two or more firms shall be accompanied by the document of formation of the Joint Venture, authenticated by a notary public or other official deputed to witness sworn statements, in which is defined precisely the conditions under which the Joint Venture will function, its period of duration, the persons authorized to represent, the participation of the several firms forming the Joint Venture, and any other information necessary to permit a full appraisal of its functioning. It shall state which of the signatories the lead partner is and whom the employer shall hold liable for the purpose of the bid offer.

A Bid submitted by:

- a) A registered Company may not be considered unless accompanied by a resolution of a Board of Directors of the Company authorizing the Bid to be made and the signatory to sign the bid on the Company's behalf;
- b) A registered Close Corporation may not be considered unless accompanied by written authority from all the signatory members of the Close Corporation authorizing the bid to be made and the signatory to sign the bid on the Close Corporation's behalf;
- c) A Partnership may not be considered unless duly signed by all partners or more parties duly authorized thereto to Power of Attorney by the parties, copy of which should accompany this bid document;
- d) A trust may not be considered unless duly signed by all trustees authorizing the bid to be made and the signatory to sign the bid on the Trust's behalf.

Bids are to be submitted in a sealed envelope addressed to the Supply Chain Manager and must be placed in the bid box. This envelope should be endorsed with the following:

➤ **Bid Number: EKZNV18/2022/23**

Description of Services: NEW 2 x 6 BED STAFF ACCOMMODATION UNITS AT MPILA CAMP IMFOLOZI GAME RESERVE

➤ **Closing date: 31 May 2023**

The employer shall not assume any responsibility for the misplacement or premature opening of the bid offer if the outer package is not sealed and marked as stated.

Failure to identify the envelope with the relevant and individual bid reference number may lead to the bid being disregarded. The envelope shall not contain documents relating to any bid other than that shown on the envelope

No bid submitted by post, fax or other electronic means will be considered. Bids sent, via courier services will only be accepted if placed into the Bid Box. It is the Bidder's responsibility to ensure that this is done.

A specific bid box is provided for the receipt of bids, and no bid found in any other box or elsewhere subsequent to the closing date and time of bid will be considered.

The employer shall return bid offer received after the closing time stated in the advertisement, unopened, (unless it is necessary to open a bid submission to obtain a forwarding address), to the bidder concerned.

Bids must be submitted on the documentation provided by the Ezemvelo KZN Wildlife (original bid documents). Submitting a copy of the original bid document will invalidate your bid.

5. Notices to Bidders

Prior to the date for submission of bids, the Employer's Representative may issue notices to bidders in the form of circulars/addenda or modify the bid documents. A copy of each notice will be issued to every Bidder, who shall duly acknowledge receipt thereof. The "Notice to Bidder" circulars shall become part of the bid documents and shall be signed by the Bidder and submitted with other bid documents.

6. Amendments to Bid by Employer

The Employer will adjust arithmetical errors in the extension of rates and totals in the bid and the Bidder will be informed of the effect of any corrections on its bid sum prior to the award of the contract. In such cases the unit will be taken as being correct.

7. Bidder to satisfy itself as to Conditions and Circumstances of Bid

The Bidder shall be deemed to have satisfied itself as to all the conditions and circumstances affecting the bid, **including the physical aspects of working areas**, and by the submission of a bid will confirm acceptance of the conditions and circumstances applicable to any subsequent contract.

Bidders are advised to check the number of pages and to satisfy themselves that none are missing or duplicated. No liability whatsoever will be recognised by KZN Wildlife in regard to any claim thereof.

8. Alternative Bids

Bidders who submit alternative bids may do so only after having submitted bids strictly in accordance with the Technical Specification, Scope of Work and Price Schedule. Should the Bidders wish to offer any alternative it shall state such alternative fully in covering documentation attached to its bid. Such documentation shall include a fully priced Price Schedule and precise details of such offer and any change in financial, constructional, maintenance or other risk between the base offer and the alternative.

9. Qualification of Bids

Bids which are qualified may be rejected and all other things being equal, will lead to rejection of the qualified bid in favour of any other non-qualified bid.

10. Offering of a Commission or Gratuity

If the Bidder, or any employee, is found to have either directly or indirectly offered, promised or given to any office bearer of the Employer any commission, gratuity, gift or other consideration, the Employer shall have the right to disqualify the bid and cancel any existing contracts without paying any compensation to the Bidder.

11. Method of Award

The Employer may award any contract to any one or more Suppliers at its discretion. The basis for any adjudication will be on consideration of a combination of the price/rates offered, functionality/technical and commercially acceptable bid(s). Black Economic Empowerment Achievements will also be taken into account.

12. Acceptance of Bid

The lowest, or any bid will not necessary be accepted and the Employer reserves the right to accept any bid either in whole, or in part or to withdraw.

Notification of acceptance of bid (an award of a contract) will be in writing signed by or on behalf of the Chief Executive Officer of the KZN Wildlife. Oral advice on the acceptance of a bid will not constitute any obligation towards, nor a contract between, a bidder and KZN Wildlife.

13. Rejection of Bids

Any bid which does not comply with the Conditions of Bid may be regarded as incomplete and may be rejected.

14. Ownership of Documentation

All documents relating to the bid remain the property of the Employer and a copy of the contract will be sent to

the successful Bidder.

15. Undertaking in Event of Withdrawal of Bid.

Should the Bidder withdraw its bid during the specified period for which it holds good, or if when notified that its bid has been accepted, fails to provide the security required under this contract within the period stipulated in the contract, it shall pay to the Employer upon demand any increased amount between the breached bid and the bid that the Employer finally accepts, without prejudice to any other rights which the Employer may have in law against the Bidder.

The Employer shall have the right to recover such sums by set-off against any money which may be due or become due to the Bidder, under any other contract, or against any guarantee or deposit which may have been furnished by or on behalf of the Bidder for the due fulfillment of any other Contract between the Employer and the Bidder. Pending the ascertainment of the amount of the Bidder's liability to the Employer in terms of this Conditions of Bid, the Employer may retain such monies, guarantee or deposit as security for any loss which the Employer may sustain by reason of the Bidder's default.

16. Precedence of Documentation

Should there be a conflict within the contract documentation, the following shall be order of precedence: -

1. Form of Agreement (Contract)
2. Technical Specification/Terms of Reference
3. Price Schedule
4. Special Conditions of Contract (JBCC Principal Building Agreement Edition 6.2 May 2018)
5. General Conditions of Contract
6. General Conditions of Bid

17. Alterations or Corrections

No unauthorised alteration or addition shall be made to the Agreement, Price Schedule, or any portion of the original text in the Bid Documents. If such addition or alteration is made, or if the Price Schedule is not properly completed, the Bid may be rejected.

Any amendment or correction in the Bid document of bided amount/sum/rate or other entry must be affected only by deleting the incorrect entry and writing the correct amount/sum/rate/entry just above it in **INK**. Each and every amendment/correction must be initialed by all signatories to the Bid.

The use of "TIPPEX" correcting fluid or any other similar substance to make corrections and/ or alterations **ANYWHERE** in the Bid Document is **NOT** permitted and any Bid altered/amended in such a manner may be declared invalid. The use of any erasable ink i.e., pencil will invalidate your bid.

18. Confidentiality of Bid Documents

All recipients of the bid documents shall, whether a bid is submitted or not, treat the details of the document as private and confidential and the general content shall not be disclosed or discussed with third parties without the prior approval of the Employer.

19. Copyright

No part of this document and any document enclosed with this enquiry may be copied, photographed or repeated in any manner or by any process without the written consent of the Employer. Copyright is reserved on specifications, system and processes contained in the document. Any person, firm, body or consultant shall be responsible jointly and severally, in their personal and corporate capacities, for any contravention of this requirement for bidding and/ or any copyright clauses contained in the document.

20. False Declarations

All information requested in this document and provided by the Bidder is accepted in good faith as being true and accurate. Any false declaration or intentional omission of relevant facts will be viewed in a serious light by The Board, and should the true facts be established, that may disqualify the Bidder concerned.

21. Consent to Risk Analysis and Access to Information

The Bidder agrees that the Employer may use the services and records of specialists or a registered credit bureau and other suppliers for information required in the original and future assessment risk, both technical and commercial.

If the Bidder is a private or unlisted public company, close corporation, or other artificial person, then it undertakes to advise the Employer immediately in writing of any agreement concluded for the change of its shareholding, membership or ownership. In such event (or if the Bidder fails to advise the Employer as required in terms hereof), the Employer reserves the right to re-assess any risk.

22. Prices quoted in bid documents

All prices quoted in bid documents must be in South African currency and be inclusive of Value-Added Tax. Unless the price is broken down into separate components of (a) net price, (b) total price, (c) total price (i.e. including the tax consideration), the price quoted on a document will be DEEMED inclusive of value – Added Tax. No bid document which has not been priced (i.e., Bid prices not inserted in the spaces on the form/s provided therefore) will be admitted.

23. Compulsory meeting (If applicable)

Confirmation of attendance of compulsory inspection will be recorded on site. Non-attendance of compulsory site inspection/information/clarification meeting will invalidate your bid. Late entries will not be allowed. Bidder must be represented at the meeting by a person who is suitably qualified and experienced to comprehend the implications of the work.

24. Tax Clearance Certificate

A Valid Original Tax Clearance Certificate (or in the case of a Joint Venture, of all partners in the Joint Venture) must be submitted with the bid document.

Please note that your Tax Clearance Certificate will be verified with SARS prior to the award of this bid, you are therefore requested to ensure that your Tax Clearance Certificate is valid until the finalization.

25. Certificates

The following certificates must be provided with the bid document. If they are not provided the bidder's offer may be considered as non-responsive:

1. Company/CC/Trust/Partnership/Co-operative registration certificates
2. Joint Venture Agreement and Power of attorney in case of Joint Ventures
3. ID certificates in case of one-man concerns

26. Eligibility

A bidder will not be eligible to submit a bid if:

1. the bidder submitting the bid is under restrictions or has principals who are under restriction to participate in the Employer's procurement due to corrupt or fraudulent practices;
2. the bidder submitting the bid is insolvent, bankrupt, has his affairs administered by a court or a judicial officer, has suspended his business activities, or is subject to legal proceeding in respect of the foregoing;
3. the bidder does not comply with the legal requirements stated in the Employer's procurement policy;
4. the bidder cannot demonstrate that he possesses the necessary professional and technical qualifications and competent, financial resources, equipment and other physical facilities, managerial capacity, personnel, experience and reputation to perform the contract.

27. Arithmetical errors

Where there is a discrepancy between the amounts in figures and in words, the amount in words shall govern.

28. Submitting a bid offer

Bidder must submit one bid only, either as a single bidding entity or as a member in a Joint Venture to provide the whole of works, services or supply identified in the contract data and described in the scope of works, unless stated otherwise in the tender data. The bid must be only in the original bid document as obtained from Ezemvelo KZN Wildlife. Copied bid document will be disregarded.

CONTRACTOR’S HEALTH AND SAFETY DECLARATION

In terms of Clause 5 (h) of the OHS Act 1993 Construction Regulations 2014 (referred to as “the Regulations” hereafter), a Contractor may only be appointed to perform construction work if the Employer is satisfied that the Contractor has the necessary competencies and resources to carry out the work safely in accordance with the Occupational Health and Safety Act No 85 of 1993 and the OHS Act 1993 Construction Regulations 2014

To that effect a person duly authorised by the Tenderer must complete and sign the declaration hereafter in detail.

Declaration by Tenderer

1. I the undersigned hereby declare and confirm that I am fully conversant with the Occupational Health and Safety Act No 85 of 1993 (as amended by the Occupational Health and Safety Amendment Act No181 of 1993), and the OHS Act 1993 Construction Regulations 2014.
2. I hereby declare that my company has the competence and the necessary resources to safely carry out the construction work under this contract in compliance with the Construction Regulations and the Employer’s Health and Safety Specifications.
3. I propose to achieve compliance with the Regulations by one of the following:
 - a) From my own competent resources as detailed in 4(a) hereafter: ***Yes/No**
 - b) From my own resources still to be appointed or trained until competency is achieved, as detailed in 4(b) hereafter: ***Yes/No**
 - c) From outside sources by appointment of competent specialist subcontractors as detailed in 3(c) hereafter: ***Yes/No**

(* = delete whatever is not applicable)

4. Details of resources I propose:

(Note: Competent resources shall include safety personnel such as a construction supervisor and construction safety officer as defined in Regulation 8, and competent persons as defined in the OHS Act 1993 Construction Regulations 2014, as applicable to this contract)

- a) Details of the competent and qualified key persons from my company’s own resources, who will form part or the contract team:

NAMES OF COMPETENT PERSONS	POSITIONS TO BE FILLED BY COMPETENT PERSONS

(b)Detail of training of persons from my company’s own resources (or to be hired) who still have to be trained to achieve the necessary competency:

(i) By whom will training be provided?

(ii) When will training be undertaken?

(iii) List the positions to be filled by persons to be trained or hired:

.....

.....

(c) Details of competent resources to be appointed as subcontractors if competent persons cannot be supplied from own company:

Name of proposed subcontractors:

.....

.....

5. I hereby undertake, if my tender is accepted, before commencement of the works under the contract, a suitable and sufficiently documented Health and Safety Plan in accordance with Regulation 7(1) of the Construction Regulations, which plan shall be subject to approval by the Employer.

6. I confirm that copies of my company’s approved Health and safety plan, the employer’s safety specifications as well as the OHSa 1993 Construction Regulations 2014 will be provided on site and will at all times be available for inspection by the contractor’s personnel, the Employer’s personnel, the Engineer, Visitors, and officials and inspectors of the Department of Labour.

7. I hereby confirm that adequate provision has been made in my tendered rates and prices in the schedule of quantities to cover the cost of all resources, action, training and all health and safety measures envisaged in the OHSa 1993 Construction Regulations (Regulation 33) for failure on the Contractor’s part to comply with the provisions of the Act and the Regulations.

8. I agree that my failure to complete and execute this declaration to the satisfaction of the employer will mean that I am unable to comply with the requirements of the OHSa 1993 Construction Regulations 2014, and accept that my tender will be prejudiced and may be rejected at the discretion of the Employer.

SIGNATURE:

DATE:

(Of person authorised to sign on behalf of the Tenderer)



PRE-CONSTRUCTION HEALTH AND SAFETY SPECIFICATION

Project: New 2 x 6 Bed Staff Accommodation units at Mpila Camp Imfolozi Game Reserve

TABLE OF CONTENTS		Pages
1.	Introduction and Background	4
1.1	Background to the Pre-construction Health and Safety Specification	
1.2	Purpose of the Pre-construction Health and Safety Specification	
1.3	Implementation of the Pre-construction Health and Safety Specification	
2.	Pre-construction Health and Safety Specification	4
2.1	Scope	
2.2	Interpretation	
2.2.1	Application	
2.2.2	Definitions	
2.3	Minimum Administrative Requirements	
2.3.1	Notification of Intention to Commence Construction Work	
2.3.2	Assignment of Contractor's Responsible Person to Supervise Health and Safety on Site	5
2.3.3	Competency for Contractor's Responsible Persons	
2.3.4	Compensation of Occupational injuries and Diseases Act (COIDA) Act 130 or 1993	
2.3.5	Occupational Health and Safety Policy	
2.3.6	Health and Safety Organogram	
2.3.7	Preliminary Hazard Identification and Risk Assessment and Progress Hazard Identification and Risk Assessment	
2.3.8	Health and Safety Representative(s)	6
2.3.9	Health and Safety Committee(s)	

2.3.10	Health and Safety Training	
2.3.10.1	Induction	
2.3.10.2	Awareness	
2.3.10.3	Competency	
2.3.11	General Record Keeping	
2.3.12	Health & Safety Audits, Monitoring and Reporting	
2.3.13	Emergency Procedures	7
2.3.14	First Aid Box and First Aid Equipment	
2.3.15	Accident / Incident Reporting and Investigation	
2.3.16	Hazards and Potential Situations	
2.3.17	Personal Protection Equipment and Clothing	
2.3.18	Occupational Health and Safety Signage	
2.3.19	Permits	8
2.3.20	Sub-contractors	
2.3.21	Incentives and Penalties	
2.4	Physical Requirements	8
2.4.1	Demolition Work	
2.4.2	Excavations, Shoring, Dewatering or Drainage	
2.4.3	Edge Protection and Penetrations	
2.4.4	Explosives and Blasting	
2.4.5	Piling	9
2.4.6	Stacking of Materials	
2.4.7	Speed Restrictions and Protection	
2.4.8	Hazardous Chemical Substances (HCS)	
2.4.9	Asbestos	
2.5	Plant and Machinery	9
2.5.1	Construction Plant	
2.5.2	Vessels under Pressure (Gas bottles including Operations)	
2.5.3	Fire Extinguishers and Fire Fighting Equipment	

2.5.4	Hired Plant and Machinery	10
2.5.5	Scaffolding / Working on Heights	
2.5.6	Falsework for Structures	
2.5.7	Lifting Machine and Tackle	
2.5.8	Ladders and Ladder work	
2.5.9	General Machinery	
2.5.10	Portable Electrical Tools / Explosive Power Tools	11
2.5.11	High Voltage Electrical Equipment (Not maintained by CDC)	
2.5.12	Public Health and Safety	
2.5.13	Night Work	
2.5.14	Facilities for Safekeeping and Eating Areas (Mess Area) for workers	
2.5.15	Transport of Workers	
2.6	Occupational Health	12
2.6.1	Occupational Hygiene	
2.6.2	Welfare Facilities	
2.6.3	Alcohol and Other Drugs	
3.	Annexure A	13
	Task Completion Form	
4.	Annexure B	14
	Principal Contractor's Responsible Persons	
5.	Annexure C	16
	Other Requirements	
6.	Annexure D	17
	Initial Hazard Identification and Risk Assessment	
7.	Annexure E	23
	Acknowledgement of Receipt of Document	

1. INTRODUCTION AND BACKGROUND

1.1 Background to the Pre-construction Health and Safety Specification

The Construction Regulations (2014) place the onus on the Client to prepare a pre-construction health & safety specification, highlighting all risks not successfully eliminated during design.

1.2 Purpose of the Pre-construction Health and Safety Specification

To assist in achieving compliance with the Occupational Health & Safety Act 85/1993 and the now promulgated Construction Regulations (2014) in order to reduce incidents and injuries. This pre-construction specification shall act as the basis for the drafting of the construction phase health & safety plan.

The pre-construction specification sets out the requirements to be followed by the Principal Contractor and other Contractors so that the health & safety of all persons potentially at risk may receive the same priority as other facets of the project e.g. cost, programme, environment, etc.

1.3 Implementation of the Pre-construction Health and Safety Specification

This specification forms an integral part of the contract, and the Contractor is required to use it at pre-tender phase when drawing up its project-specific construction phase health & safety plan. The Principal Contractor shall forward a copy of this specification to all Contractors at their bidding stage so that they can in turn prepare health & safety plans relating to their operations.

2. PRE-CONSTRUCTION HEALTH AND SAFETY SPECIFICATION

2.1 Scope

This Specification covers the requirements for eliminating and mitigating incidents and injuries on the particular project

The scope also addresses legal compliance, hazard identification and risk assessment, risk control, and promoting a health and safety culture amongst those working on the project. The specification also makes provision for the protection of those persons other than employees.

2.2 Interpretations

2.2.1 Application

This specification is a compliance document drawn up in terms of South African legislation and is therefore binding. It must be read in conjunction with relevant legislation as noted previously.

2.2.2 Definitions

The definitions as listed in the Occupational Health & Safety Act 85/1993 and Construction Regulations (2014) shall apply.

2.3 Minimum Administrative Requirements

2.3.1 Notification of Intention to Commence Construction Work

The Contractor shall notify the Provincial Director of the Department of Labour in writing before construction work commences. A copy of this notification must be forwarded to the Client on appointment.

2.3.2 Assignment of Contractor's Responsible Persons to Supervise Health and Safety on Site

The Contractor shall submit supervisory appointments as well as any relevant appointments in writing (as stipulated by the OHSA and Construction Regulations), prior to commencement of work. Proof of competency must be included. See annexure B.

2.3.3 Competency for Contractor's Appointed Competent Persons

Contractors' competent persons for the various risk management portfolios shall fulfil the criteria as stipulated under the definition of Competent in accordance with the Construction Regulations (2014). Proof of competence for the various appointments must be included.

2.3.4 Compensation of Occupational Injuries and Diseases Act 130 of 1993 (COIDA)

The Principal Contractor shall submit a letter of good standing with its Compensation Insurer to the Client as proof of registration. Contractors shall submit proof of registration to the Principal Contractor before they commence work on site.

2.3.5 Occupational Health and Safety Policy

The Principal Contractor and all Contractors shall submit a Health and Safety Policy signed by their Chief Executive Officer. The Policy must outline objectives and how they will be achieved and implemented by the Company / Contractor.

2.3.6 Health and Safety Organogram

The Principal Contractor and all Contractors shall submit an organogram, outlining the Health and Safety Site Management Structure including the relevant appointments/competent persons. In cases where appointments have not been made, the organogram shall reflect the intended positions. The organogram shall be updated when there are any changes in the Site Management Structure.

2.3.7 Preliminary Hazard Identification and Risk Assessment and Progress Hazard Identification and Risk Assessment

The Contractor shall cause a hazard identification to be performed by a competent person before commencement of construction work, and the assessed risks shall form part of the construction phase health and safety plan submitted for approval by the Client. The risk assessment must include;

- a) A list of hazards identified as well as potentially hazardous tasks;
- b) A documented risk assessment based on the list of hazards and tasks;
- c) A set of safe working procedures (method statements) to eliminate, reduce and/or control the risks assessed;
- d) A monitoring and review procedure of the risks assessment as the risks change.

The Principal Contractor shall ensure that all Contractors are informed, instructed and trained by a competent person regarding any hazards, risks and related safe work procedures before any work commences and thereafter at regular intervals as the risks change and as new risks develop.

The Principal Contractor shall be responsible for ensuring that all persons who could be negatively affected by its operations are informed and trained according to the hazards and risks and are conversant with the safe work procedures, control measures and other related rules (tool box talk strategy to be implemented).

2.3.8 Health and Safety Representative(s)

The Principal Contractor and all Contractors shall ensure that where required Health and Safety Representative(s) are appointed under consultation and trained to carry out their functions. The appointment must be in writing. The Health and Safety Representative shall carry out regular inspections, keep records and report all findings to the Responsible Person forthwith and at health & safety meetings.

2.3.9 Health and Safety Committees

The Principal Contractor shall ensure that project health and safety meetings are held monthly and minutes are kept on record. Meetings must be organised and chaired by the Principal Contractor's Responsible Person. All Contractors' Responsible Persons and Health & Safety Representatives shall attend the monthly health & safety meetings. Contractors shall also have their own internal health & safety committees in accordance with the OHS Act 85/1993 and minutes of their meetings shall be forwarded to the Principal Contractor on a monthly basis.

2.3.10 Health and Safety Training

2.3.10.1 Induction

The Principal Contractor shall ensure that all site personnel undergo a risk-specific health & safety induction training session before starting work. A record of attendance shall be kept in the health & safety file. **A suitable venue must be supplied to house this training.**

2.3.10.2 Awareness

The Principal Contractor shall ensure that, on site, periodic toolbox talks take place at least once per week. These talks should deal with risks relevant to the construction work at hand. A record of attendance shall be kept in the health & safety file. All Contractors have to comply with this minimum requirement.

2.3.10.3 Competency

All competent persons shall have the knowledge, experience, training, and qualifications specific to the work they have been appointed to supervise, control, carry out. This will have to be assessed on a regular basis e.g. periodic audits by the Client, progress meetings, etc. The Principal Contractor is responsible to ensure that competent Contractors are appointed to carry out construction work.

2.3.11 General Record Keeping

The Principal Contractor and all Contractors shall keep and maintain Health and Safety records to demonstrate compliance with this Specification, with the OHS Act 85/1993; and with the Construction Regulations (2014). The Principal Contractor shall ensure that all records of incidents/accidents, training, inspections, audits, etc. are kept in a health & safety file held in the site office. The Principal Contractor must ensure that every Contractor opens its own health & safety file, maintains the file and makes it available on request.

2.3.12 Health & Safety Audits, Monitoring and Reporting

The Client shall conduct monthly health & safety audits of the work operations including a full audit of physical site activities as well as an audit of the administration of health & safety. The Principal Contractor is obligated to conduct similar audits on all Contractors appointed by it. Detailed reports of the audit findings and results shall be reported on at all levels of project management meetings/forums. Copies of the Client audit reports shall be kept in the Primary Project Health & Safety File while the Principal Contractor audit reports shall be kept in their file, a copy being forwarded to the Client. Contractors have to audit their sub-contractors and keep records of these audits in their health & safety files, available on request.

2.3.13 Emergency Procedures

The Principal Contractor shall submit a detailed Emergency Procedure for approval by the Client prior to commencement on site. The procedure shall detail the response plan including the following key elements:

- List of key competent personnel;
- Details of emergency services;
- Actions or steps to be taken in the event of the specific types of emergencies;
- Information on hazardous material/situations.

Emergency procedure(s) shall include, but shall not be limited to, fire, spills, accidents to employees, use of hazardous substances, bomb threats, major incidents/accidents, etc. The Principal Contractor shall advise the Client in writing forthwith, of any emergencies, together with a record of action taken. A contact list of all service providers (Fire Department, Ambulance, Police, Medical and Hospital, etc) must be maintained and available to site personnel.

2.3.14 First Aid Boxes and First Aid Equipment

The Principal Contractor and all Contractors shall appoint in writing First Aider(s). The appointed First Aider(s) are to be sent for accredited first aid training. Valid certificates are to be kept on site. The Principal Contractor shall provide an on-site First Aid Station with first aid facilities, including first aid boxes adequately stocked at all times. All Contractors with more than 5 employees shall supply their own first aid box. Contractors with more than 10 employees shall have a trained, certified first aider on site at all times.

2.3.15 Accident / Incident Reporting and Investigation

Injuries are to be categorised into first aid; medical; disabling; and fatal. The Principal Contractor must stipulate in its construction phase health & safety plan how it will handle each of these categories. When reporting injuries to the Client, these categories shall be used. All injuries shall be investigated by the Principal Contractor, with a report being forwarded to the Client forthwith. All Contractors have to report on the 4 categories of injuries to the Principal Contractor at least monthly. The Principal Contractor must report all injuries to the Client in the form of a detailed injury report at least monthly.

2.3.16 Hazards and Potential Situations

The Principal Contractor shall immediately notify other Contractors as well as the Client of any hazardous or potentially hazardous situations that may arise during performance of construction activities.

2.3.17 Personal Protective Equipment (PPE) and Clothing

The Principal Contractor shall ensure that all workers are issued and wear hard hats, safe footwear and overalls. The Principal Contractor and all Contractors shall make provision and keep adequate quantities of SABS approved PPE on site at all times. The Principal Contractor shall clearly outline procedures to be taken when PPE or Clothing is:

- Lost or stolen;
- Worn out or damaged.

The above procedure applies to Contractors and their Sub-contractors, as they are all Employers in their own right.

2.3.18 Occupational Health and Safety Signage

The Contractor shall provide adequate on-site OHS signage. Including but not limited to: 'no unauthorised entry', 'report to site office', 'site office', 'beware of overhead work', 'hard hat area'. Signage shall be posted up at all entrances to site as well as on site in strategic locations e.g. access routes, stairways, entrances to structures and buildings, scaffolding, and other potential risk areas/operations.

2.3.19 Permits

Permits may include the following:

- Use of Explosives and Blasting
- Work for which a fall prevention plan is required
- Use of cradles

2.3.20 Contractors and Sub-contractors

The Principal Contractor shall ensure that all Contractors under its control comply with this Specification, the OHS Act 85/1993, Construction Regulations (2014), and all other relevant legislation that may relate to the activities directly or indirectly. The Contractor, when appointing other Contractors as 'Sub-contractors', shall mutatis mutandis ensure compliance.

2.3.21 Incentives and Penalties

Certain incentives will be provided for ongoing compliance to the provisions of the construction phase health & safety plan submitted by the Principal Contractor.

Penalties will be implemented for ongoing non-compliance to the provisions of the construction-phase health & safety plan as submitted by the Principal Contractor.

2.4 Physical Requirements

2.4.1 Demolition Work

Prior to any demolition work being carried out, the Principal Contractor shall submit a safe working procedure and a detailed engineering survey for approval by the Client. Acceptance will then be issued to the Principal Contractor to proceed with the demolition work. The Principal Contractor shall ensure that demolition work complies with the Construction Regulations (2014).

2.4.2 Excavations, Shoring, Dewatering or Drainage

The Principal Contractor and any relevant Contractors shall make provision in their tender for shoring, dewatering or drainage of any excavation as per this specification.

The Contractor shall make sure that:

- a) The excavations are inspected before every shift and a record is kept;
- b) Safe work procedures have been communicated to the workers;
- c) The safe work procedures are enforced and maintained by the Contractor's Responsible Persons at all times;
- d) The requirements as per section 13 of the Construction Regulations are adhered to.

2.4.3 Edge Protection and Penetrations

The Principal Contractor must ensure that all exposed edges and openings are guarded and demarcated at all times until permanent protection has been erected. The Principal Contractor's risk assessment must include these items. E.g. protection of decking edges, finished floor slab edges, stairways, floor penetrations, lift shafts, and all other openings and areas where a person may fall.

2.4.4 Explosives and Blasting

The Principal Contractor shall ensure that the use of explosives and blasting (where required) be undertaken by a competent Contractor. A Safe Work Procedure (SWP) must be submitted to the Client for approval before commencement of blasting work. The Client will issue a permit to authorise the operation.

2.4.5 Piling

The Contractor shall ensure that piling is undertaken by a competent Contractor. A SWP shall be submitted to the Client for approval before commencement of this work.

2.4.6 Stacking of Materials

The Principal Contractor and other relevant Contractors shall ensure that there is an appointed staking supervisor and all materials, formwork and all equipment is stacked and stored safely.

2.4.7 Speed Restrictions and Protection

The Principal Contractor shall ensure that all persons in its employ, all Contractors, and all those that are visiting the site are aware and comply with the site speed restriction(s), especially in big 5 game reserves. Separate vehicle and pedestrian access routes shall be provided, maintained, controlled, and enforced.

2.4.8 Hazardous Chemical Substances (HCS)

The Principal Contractor and other relevant Contractors shall provide the necessary training and information regarding the use, transport, and storage of HCS. The Principal Contractor shall ensure that the use, transport, and storage of HCS is carried out as prescribed by the HCS Regulations. The Contractor shall ensure that all hazardous chemicals on site have a Material Safety Data Sheet (MSDS) on site and the users are made aware of the hazards and precautions that need to be taken when using the chemicals. The First Aiders must be made aware of the MSDS and how to treat HCS incidents appropriately.

2.4.9 Asbestos

Not applicable

2.5 Plant and Machinery

2.5.1 Construction Plant

“Construction Plant” includes all types of plant including but not limited to, cranes, piling rigs, excavators, road vehicles, and all lifting equipment.

The Principal Contractor shall ensure that all such plant complies with the requirements of the OHS Act 85/1993 and Construction Regulations (July 2014). The Principal Contractor and all relevant Contractors shall inspect and keep records of inspections of the construction plant used on site. Only authorised/competent persons are to use machinery under proper supervision. Appropriate PPE and clothing must be provided and maintained in good condition at all times.

2.5.2 Pressure Equipment Regulations and Gas Bottles

The Principal Contractor and all relevant Contractors shall comply with the Vessels under Pressure Regulations, including:

- Providing competency and awareness training to the operators;
- Providing PPE or clothing;
- Inspect equipment regularly and keep records of inspections;
- Providing appropriate fire fighting equipment (Fire Extinguishers) on hand.

2.5.3 Fire Extinguishers and Fire Fighting Equipment

The Principal Contractor and relevant Contractors shall provide adequate, regularly serviced fire fighting equipment located at strategic points on site, specific to the classes of fire likely to occur. The appropriate notices and signs must be posted up as required.

2.5.4 Hired Plant and Machinery

The Principal Contractor shall ensure that any hired plant and machinery used on site is safe for use. The necessary requirements as stipulated by the OHS Act 85/1993 and Construction Regulations (2014) shall apply. The Principal Contractor shall ensure that operators hired with machinery are competent and that certificates are kept on site in the health & safety file. All relevant Contractors must ensure the same.

2.5.5 Scaffolding / Working at Heights

Working at heights includes any work that takes place in an elevated position. The Contractor must submit a risk-specific fall prevention plan in accordance with the Construction Regulations (2014) before this work is undertaken. The fall prevention plan must be approved by the Client before work may commence, and a permit to operate will be issued.

2.5.6 Formwork and Support work for Structures

The Principal Contractor shall ensure that the provisions of section 10 of the Construction Regulations (2014) are adhered to. These provisions must include but not be limited to ensuring that all equipment used is examined for suitability before use; that all formwork and support work is inspected by a competent person immediately before, during and after placement of concrete or any other imposed load and thereafter on a daily basis until the formwork and support work has been removed. Records of all inspections must be kept in a register on site.

2.5.7 Lifting Machines and Tackle

The Principal Contractor and all Contractors shall ensure that lifting machinery and tackle is inspected before use and thereafter in accordance with the Driven Machinery Regulations and the Construction Regulations (section 22). There must be a competent lifting machinery and tackle inspector who must inspect the equipment daily or before use, taking into account that:

- All lifting machinery and tackle has a safe working load clearly indicated;
- Regular inspection and servicing is carried out;
- Records are kept of inspections and of service certificates;
- There is proper supervision in terms of guiding the loads that includes a trained banksman to direct lifting operations and check lifting tackle;
- The tower crane bases have been approved by an engineer;
- The operators are competent as well as physically and psychologically fit to work and in possession of a medical certificate of fitness to be available on site.

2.5.8 Ladders and Ladder Work

The Principal Contractor shall ensure that all ladders are inspected monthly, are in good safe working order, are the correct height for the task, extend at least 1m above the landing, fastened and secured, and at a safe angle. Records of inspections must be kept in a register on site. Contractors using their own ladders must ensure the same.

2.5.9 General Machinery

The Principal Contractor and relevant Contractors shall ensure compliance with the Driven Machinery Regulations, which include inspecting machinery regularly, appointing a competent person to inspect and ensure maintenance, issuing PPE or clothing, and training those who use machinery

2.5.10 Portable Electrical Tools and Explosive Powered Tools

The Contractor shall ensure that use and storage of all explosive powered tools and portable electrical tools are in compliance with relevant legislation. The Contractor shall ensure that all electrical tools, electrical distribution boards, extension leads, and plugs are kept in safe working order. Regular inspections and toolbox talks must be conducted to make workers aware of the dangers and control measures to be implemented e.g. personal protection equipment, guards, etc.

The Contractor shall consider the following:

- A competent person undertakes routine inspections and records are kept;
- Only authorised trained persons use the tools;
- The safe working procedures apply;
- Awareness training is carried out and compliance is enforced at all times; and
- PPE and clothing is provided and maintained.
- A register indicating the issue and return of all explosive round;
- Signs to be posted up in the areas where explosive powered tools are being used.

2.5.11 High Voltage Electrical Equipment

No high voltage electrical equipment is present on, under or above the construction area.

2.5.12 Public and Site Visitor Health & Safety

The Principal Contractor shall ensure that every person working on or visiting the site, as well as the public in general, shall be made aware of the dangers likely to arise from site activities, including the precautions to be taken to avoid or minimise those dangers. Appropriate health and safety notices and signs shall be posted up, but shall not be the only measure taken.

Both the Client and the Principal Contractor have a duty in terms of the OHS Act 85/1993 to do all that is reasonably practicable to prevent members of the public and site visitors from being affected by the construction activities.

Site visitors must be briefed on the hazards and risks they may be exposed to and what measures are in place or should be taken to control these hazards and risks. A record of these 'inductions' must be kept on site in accordance with the Construction Regulations.

2.5.13 Night Work

The Principal Contractor must ensure that adequate lighting is provided to allow for work to be carried out safely.

2.5.14 Transport of Workers

The Principal Contractor and other Contractors shall not:

- Transport persons together with goods or tools unless there is an appropriate area or section to store them;
- Transport persons in a non-enclosed vehicle, e.g. truck; there must be a proper canopy (properly covering the back and top) with suitable sitting area. Workers shall not be permitted to stand or sit at the edge of the transporting vehicle.
- Transport workers in bakkies unless they are closed/covered and have the correct number of seats for the passengers.

2.6 Occupational Health

2.6.1 Occupational Hygiene

Exposure of workers to occupational health hazards and risks is very common in any work environment, especially in construction. Occupational exposure is a major problem and all Contractors must ensure that proper health and hygiene measures are put in place to prevent exposure to these hazards. Prevent inhalation, ingestion, absorption, and noise induction. Site-specific health risks are tabled in Annexure C e.g. cement dust, wet cement, wood-dust, noise, etc.

2.6.2 Welfare Facilities

The Principal Contractor must supply Sufficient toilets (1 toilet per 30 workers), showers (1 for every 15 workers), changing facilities, hand washing facilities, soap, toilet paper, and hand drying material must be provided. Waste bins must be strategically placed and emptied regularly. Safe, clean storage areas must be provided for workers to store personal belongings and personal protective equipment. Workers should not be exposed to hazardous materials/substances while eating and must be provided with sheltered eating areas.

2.6.3 Alcohol and other Drugs

No alcohol and other drugs will be allowed on site. No person may be under the influence of alcohol or any other drugs while on the construction site. Any person on prescription drugs must inform his/her superior, who shall in turn report this to the Principal Contractor forthwith. Any person suffering from any illness/condition that may have a negative effect on his/her safety performance must report this to his/her superior, who shall in turn report this to the Principal Contractor forthwith. Any person suspected of being under the influence of alcohol or other drugs must be sent home immediately, to report back the next day for a preliminary inquiry. A full disciplinary procedure must be followed by the Contractor concerned and a copy of the disciplinary action must be forwarded to the Principal Contractor for his records.

Project name: Date:

PRE-CONSTRUCTION HEALTH AND SAFETY SPECIFICATION (HSS)

Project: New 2 x 6 Bed Staff Accommodation units at Mpila Camp Imfolozi Game Reserve

ANNEXURE A

The Principal Contractor and Contractors must submit proof of compliance with Annexure A with the construction phase H&S plan where applicable.

HSS Item No.	Requirement	OHS Requirement	Submission Date
2.3.1	Notification of Intention to Commence Construction / Building Work	Complete Schedule 1 (Construction Regulations)	Before commencement on site
2.3.2	Assignment of Responsible Person to Supervise Construction Work	All relevant appointments, as per OHS Act and Construction Regs.	Before commencement on site
2.3.3	Competence of Responsible Persons	Client Requirement & OHS Act	Together with H&S plan
2.3.4	Compensation of Occupational Injuries and Diseases Act (COIDA) 130 of 1993	COIDA Requirement	Together with H&S plan
2.3.5	Occupational Health and Safety Policy	OHS Act	Together with H&S plan
2.3.6	Health and Safety Organogram	Client Requirement	Together with H&S plan
2.3.7	Initial Hazard Identification and Risk Assessment based on the Client's assessment	Construction Regs.	Together with H&S plan
2.3.8	Health and Safety Representative	OHS Act	Submit as soon as there are more than 20 employees on site
	Other		

ASSIGNMENT OF PRINCIPAL CONTRACTOR'S RESPONSIBLE PERSONS

Project: New 2 x 6 Bed Staff Accommodation units at Mpila Camp Imfolozi Game Reserve

ANNEXURE B

The Principal Contractor shall make the following appointments according to the initial risk assessment: (further appointments could become necessary as project progresses)

Appointment	OHSA Reference	Requirement
CEO Assignee	Section 16(2)	A competent person to assist with the on-site H&S overall responsibility – Contractor's Responsible Person
Construction Work Supervisor	CR 8.7	A competent person to supervise and be responsible of Health & Safety related issues on site. The person is appointed to assist the CEO with his/her overall duties.
Subordinate Construction Work Supervisors	CR 8.8	A competent person to assist with daily supervision of construction / building work. The person assists the Construction Work Supervisor.
Health & Safety Representative(s)	Section 17	A competent person(s) to inspect H&S in reference to plant, machinery and Health & Safety of persons in the workplace.
Health & Safety Committee Member(s)	Section 19	A competent person(s) representing the employer to assist with the on site Health & Safety matters.
Incident Investigator	GAR 8	A competent person to investigate incidents / accidents on site and could be: <ul style="list-style-type: none"> • The employer • H&S Representative • Designated person • Member of the H&S Committee
Risk assessment co-ordinator	CR 9	A competent person to co-ordinate all risk assessments on behalf of the Principal Contractor. The same applies to Contractors.
Fall protection plan co-ordinator	CR 10	A competent person to prepare & amend the fall protection plan.
First Aiders	GSR 3	A qualified person to address all on site first aid cases.
Machinery Inspector	GSR 2.1	A competent person to supervise machinery.
Lifting machine & equipment inspector	DMR 18	A competent person to inspect lifting machines, equipment & tackle.
Scaffolding Inspector	SABS 085	A competent person to inspect scaffolding before use and every time after bad weather, etc.
Scaffolding erector	GSR 13D	A competent person to erect scaffolding.

Scaffolding supervisor	SABS 085	A competent person to supervise scaffolding.
Formwork & support work inspector	CR 12	A competent person to inspect formwork & support work.
Excavation Inspector	CR 13	A competent person to inspect excavation work and ensure that approved safe working procedures. Are followed at all times.
Ladder Inspector	GSR 13A	A competent person to inspect ladders daily and ensure they are safe for use, keeping monthly record.
Stacking Supervisor	CR 28	A competent person to supervise all stacking and storage operations.
Explosive powered tools inspector/supervisor	CR 21	A competent person to inspect & clean the tool daily and controlling all operations thereof.
Temporary electrical installations supervisor	CR 24	A competent person to control all temporary electrical installations.
Fire-fighting equipment inspector	CR 29	A competent person to inspect fire-fighting equipment.

OTHER REQUIREMENTS

Project: New 2 x 6 Bed Staff Accommodation units at
Mpila Camp Imfolozi Game Reserve

ANNEXURE C

The Principal Contractor shall comply but not be limited to the following requirements: report on these to the Client at progress meetings or at least monthly which ever is sooner.

What	When	Output	Accepted by Client & date
Induction training	Every worker before he/she starts work.	Attendance registers	
Awareness Training (Tool Box Talks)	At least weekly	Attendance registers	
Health & Safety Reports	Monthly	Report covering: <ul style="list-style-type: none"> • Incidents / accidents and investigations • Non conformances by employees & contractors • Internal & External H&S audit reports 	
Emergency procedures	Ongoing evaluation of procedure	Table procedure in writing as well as tel. numbers	
Risk assessment	Updated and signed off at least monthly	Documented risk assessment	
Safe work procedures	Drawn up before workers are exposed to new risks	Documented set of safe work procedures (method statements), updated and signed off.	
General Inspections	Weekly & daily	Report OHS Act compliance: <ul style="list-style-type: none"> • Scaffolding • Excavations • Formwork & support work • Explosive tools 	
General Inspections	Monthly	<ul style="list-style-type: none"> • Fire fighting equipment • Portable electrical equipment • Ladders • Lifting equipment/slings 	
List of contractors	List to be updated weekly	Table list, number of workers and Company tel. numbers	
Workman's Compensation	Ongoing	Table a list of Contractors' workman's compensation proof of good standing.	
Construction site rules & Section 37.2 Mandatary Agreement	Ongoing	Table a report of all signed up Mandataries.	



2 x 6 Bed Staff Accommodation units at Mpila Camp Imfolozi Game Reserve

CONSTRUCTION PHASE

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

1. PRINCIPLES

This development is taking place within a proclaimed protected area, which is considered to be a sensitive site in terms of the National Environmental Management Act and is subject to stringent protective controls. While construction activities can be disruptive and / or destructive by nature, it is essential that the impact of these activities in all protected areas is kept to a minimum. This means that environmental and cultural heritage protection and rehabilitation measures must become priority components of all development projects within protected areas, and conflicts or decisions must be resolved in their favour.

Therefore there are several general principles that form the basis of the EMP document for this proposed development and guide decisions. These are as follows:-

- To minimise and avoid damage to natural habitats, fauna and flora within the development area.
- To take active measures to minimise soil loss due to both wind and water action from the development area.
- To take active measures to manage potentially polluting activities and to prevent pollution of any sort both on the site and into the surrounding areas.
- To minimise and avoid damage to identified cultural heritage features within the development area.
- To minimise any disruptive impact that the development may have on visitors and on the sense of place of the protected area.

2. SITE PROTECTION MEASURES

In order to comply with the above principles, the following broad guidelines are applicable:

2.1 General

- a. All Reserve Rules must be adhered to by contractors, subcontractors and staff (this includes behaviour, disturbance and access. The lead contractor will be held responsible for subcontractors and their staff. Staff and subcontractors may be refused entrance from the protected area should they fail to comply with the EMP, Reserve Rules or relevant legislation.
- b. Open fires for heating and cooking shall only be permitted by agreement with Reserve and Camp Management, and only in designated areas at the staff accommodation. Fires are not permitted on the site.
- c. Areas disturbed by construction activities must be minimised. This will in turn reduce many of the construction related environmental impacts of the project and will also reduce rehabilitation requirements and costs.
- d. Contractors and construction staff may in no way interfere with visitors to the protected area. All interactions with visitors should be through the reserve management staff. Visitors shall likewise not be permitted to enter the construction site without permission and suitable signage must be in place.
- e. All relevant safety precautions must be taken and emergency plans put in place to prevent damage or injury to humans and animals due to construction or related activities or structures.
- f. Construction programming and methods should be designed to minimise construction impacts on the surrounding environment.

2.2 Site Establishment

- a. Areas for construction and related activities must be agreed upon by the relevant technical and ecological staff and roped off from the surrounding, undisturbed environments. Access routes and storage areas must be similarly demarcated and adhered to. No movement or storage of materials, machinery or personnel shall be permitted in the surrounding natural areas.
- b. Routes for construction access and haul roads shall be existing paths and routes. All contractors and construction staff, vehicles and materials movement shall be confined to these paths and roads.
- c. Site layout (including the contractors camp) must be designed to minimise impacts and risks to visitors to the protected area (such as visual or noise disturbance) and services (such as sanitation, waste and cooking facilities).
- d. All materials and machinery for construction or related activities are to be handled, stored, transported and maintained in accordance with the relevant regulations. No machinery is to be serviced on site.

- e. The Contractors and construction staff shall ensure that dust generation by construction and related activities, is kept to a minimum. Roads and working surfaces should be maintained regularly and this may include spraying with water to damp down excess dust. Water used for this purpose should not be in quantities great enough to generate run-off or cause erosion, nor contain pollutants.
- f. Contractors and construction staff shall ensure that the site is kept clean and tidy at all times. All designated working areas shall be cleared of all waste materials, be they rubble, building scraps, domestic or industrial wastes.

2.3 Vegetation and Animals

- a. Contractors and construction staff may in no way interfere with the natural vegetation, animals or surroundings. Any components of the natural environment that may be disturbed for construction related purposes must be specified and agreed to by reserve management or the regional ecologist.
- b. Burning of vegetation including tree trunks and stumps cut during site clearing and establishment shall not be permitted unless specifically authorised by the Reserve Management and Regional Ecologist. All cut vegetation shall be removed to the local landfill sites designated by the Regional Ecologist and Reserve Management. Smaller, thorny material may be kept and used for brush packing and rehabilitation if appropriate.
- c. Plants within the designated development area shall only be moved or removed as authorised by the Regional Ecologist and these should be set out in a schedule for reference. Any shrubs or trees of significant size shall be protected and permission obtained to cut or remove these as above. Ideally these should also be marked with danger-tape.
- d. Removal, damage or disturbance of any plant outside the designated area is not permitted. Gathering of firewood shall not be permitted.
- e. An alien plant control programme shall be put in place from the start of construction and all alien plants removed immediately. This must be a regular and managed programme until such time as natural vegetation has reclaimed previously disturbed areas. Alien plants should not be allowed to become established and build up a seed-bank in the soil, which will lead to more costly and longer term alien plant control programmes being required for the development.
- f. Animals resident within or moving through the designated area shall not be killed nor unnecessarily disturbed. Should contractors or construction staff notice any sensitive species on site, Reserve Management or the Regional Ecologist should be alerted and the appropriate action as advised by these specialists, taken.

2.4 Soils

- a. Topsoil must be conserved from all disturbed sites for use in rehabilitation.
- b. Topsoil stockpiles must not be compacted or allowed to exceed 1.5m in height.
- c. At all stages of the contract, erosion of bare soil, excavation surfaces and erosion of stockpiles shall be prevented by the application of appropriate erosion control measures (such a biddum cloth or berms).
- d. Stormwater drainage measures shall be constructed on access routes within the site. Access routes must not result in or contribute to erosion.

2.5 Wastes, Pollution and Nuisance

- a. All wastes (including pollutants, spills and spoil) arising from construction or related activities are to be handled, stored, transported and disposed of in accordance with the relevant regulations. All efforts should be made to minimise, reclaim or recycle waste materials and no construction wastes may remain on site at the end of the contract period.
- b. Only a single day's fuel requirements may be stored on the site at any time, with appropriate safety precautions. These shall be stored in a designated area with adequate pollution prevention and control measures (hardened surface area and bunding). Exceptions must be with the Reserve Manager's permission.
- c. No waste of a solid, liquid or gaseous nature shall be allowed to pollute the site or the surrounding environment.
- d. All waste emissions (hazardous, airborne, liquid and solid) from the construction site and related activities shall be kept within the limits of standards set in terms of the relevant national and local pollution legislation and regulations.
- e. Accidental pollution or spillage incidents shall be reported to the Regional Ecologist and Reserve Management immediately they occur and shall be cleaned up (to the satisfaction of the Regional Ecologist) by Technical Services staff. Expert help or advice may be requested from Reserve Management or the Regional Ecologist. Spills of over 200 litres shall be reported to the environmental authorities.
- f. Machinery shall be maintained so that excessive oil and fuel smoke is avoided. This is in the interests of the long term care of such machinery as well. Any item of machinery that breaks down must be removed to a suitable workshop for repairs and no drainage of lubricants or fuels shall be allowed on the construction site.
- g. Vehicle and plant maintenance shall only take place off-site and in areas demarcated for that purpose. Should any fuel, oil, transmission or hydraulic fluid be spilled onto the soils on the construction site, this soil should be scraped up and placed in a suitable, non-permeable waste disposal container, provided for that purpose. The Regional Ecologist must be informed immediately and any additional steps to limit the impacts of the spill and protect the natural environment that are advised by him/her must be followed.

- h. All reasonable measures shall be taken to reduce air emissions in the form of dust, smoke and noxious gases. These measures may include the dampening of road surfaces to reduce vehicular dust.
- i. Contractors and construction staff shall not be permitted to use any stream, river, wetland or other naturally occurring water body or source adjacent to or within the designated area for the purposes of bathing, washing of clothes, vehicles, the disposal of any type of waste, nor any construction related activities.
- j. All truck washing and washing of cement mixing and transporting vehicles and other equipment shall take place away from the site and watercourses. This polluted water must be collected and directed through oil traps to settlement ponds. Wastewater on the construction site may not be disposed of directly into drainage lines, streams, rivers, or onto the soils and no polluted water shall be allowed to enter the natural environment without adequate treatment to purify it to an acceptable standard as directed by the Department of Water Affairs. Any polluted water or cement sediments shall be collected and disposed of as instructed by the Regional Ecologist and Reserve Management.
- k. Refuse shall be collected and stored in demarcated areas, skips or suitable bins. Waste disposal containers shall be placed at convenient locations throughout the site. The containers must be designed to prevent refuse being blown out by the wind and must be scavenger-proof. All food wastes should be removed from the site on a daily basis.
- l. All potentially hazardous waste generated at the site shall be removed and disposed of by qualified Technical staff, in a manner approved by the Regional Ecologist and Reserve Management.
- m. Appropriate directional and intensity settings aimed at minimising noise emitted from the construction site should be maintained on hooters and sirens, while adhering to safety standards. Silencer units on plant and vehicles shall be maintained in good working order.
- n. Contractors and construction staff shall not unnecessarily make other noise (such as radios).

2.6 Reinstatement and Rehabilitation

- a. All areas disturbed by construction and related activities must be fully rehabilitated before the development is considered complete. This would include alien plant control measures being applied and monitored.

2.7 Monitoring and Auditing

- a. Monitoring should be conducted at regular intervals in the development project life-cycle. Suitable staff (such as the Regional Ecologist together with the Reserve Manager) should conduct the monitoring and concerns and recommendations communicated to the project manager. Significant concerns that fail to be addressed should be reported to Reserve Management and the Planning Division.
- b. A final construction audit should be conducted immediately before site handover. Particular emphasis should be placed on the status of the site rehabilitation. A copy of this audit to be forwarded to the Planning Division.



EZEMVELO KZNWILDLIFE -IMFOLOZI GAME RESERVE- CONTRACTOR STANDING ORDERS

The following are the Contractor standing orders for the **Imfolozi Game Reserve** section of the Hluhluwe Imfolozi Game Reserve as they pertain to contractors that work within the borders of the Park their staff and visitors.

TO: _____

FROM: Project Manager

DATE: _____ Tender / Quotation Number: _____

1. FAUNA AND FLORA

1. 1. All plants and animals inside the park are protected. Anyone found in possession of any plant or animal material, or interferes with any plant or animal, will be charged criminally. Plant or animal material includes bark, leaves, thorns, suckers, seeds and roots of any plant (excluding alien invasive species), as well as meat, feathers, eggs or egg shell, skin, hair, hoof, claw, tooth, bone or horn of any animal. This includes animals such as snakes and chameleons.

1. 2. No contractor staff, sub contractors and their staff, suppliers or visitors may feed any wild animals.

1. 3. Any trap or snare found in the reserve must be left alone and reported to the CM or Field Rangers immediately.

1. 4. Any animal found in a snare is to be left alone and reported to the CM or Field Rangers immediately.

1. 5. No contractor staff, sub contractors and their staff, suppliers or visitors may be in possession of any trap, weapon or snare at any time.

1. 6. No fire wood may be collected from inside the reserve.

2. FIRE

2. 1. No open fires are permitted in the park for any reason and at any time.

3. LITTER

3. 1. No litter is to be left in the reserve; all litter is to be removed by the contractor to the nearest municipal dump. This includes cement bags, plastic packets, boxes, building rubble, solid waste and all other rubbish.

3. 2. Contractor staff found littering or ignoring litter whether theirs or not, will be removed from the park with immediate effect.

4. LIQUID WASTE AND SEWERAGE

4. 1. The provision of chemicals toilets is the responsibility of the contractor.
4. 2. No contractor staff, sub contractors and their staff and suppliers will be permitted to use the toilets in the staff quarters or anywhere else within the park.
4. 3. Contractor staff, sub contractors and their staff and suppliers found urinating or defecating anywhere in the park will be removed from the park with immediate effect.
- 4.4. No contractor staff, sub contractors and their staff and suppliers will be permitted to use the showers or baths in the staff quarters or anywhere else within the park.

5. TOOLS AND EQUIPMENT

5. 1. All tools and equipment are the property of the state.
5. 2. No tools and equipment will be leant or borrowed to contractor staff, sub contractors and their staff and suppliers at any time.
5. 3. Contractor staff, sub contractors and their staff and suppliers found near or in the workshop area without permission or a valid reason will be removed from the park and may be charged with trespassing.
5. 4. Your personal items are your responsibility, should any of your personal items be destroyed or damaged due to fire, flood or any other reason, you will not be compensated for the loss of those items by EKZN Wildlife.

6. ALCOHOL AND DRUGS

6. 1. No contractor staff, sub contractors and their staff and suppliers are to be in possession of or under the influence of alcohol or illegal drugs whilst within the park.
6. 2. No contractor staff, sub contractors and their staff and suppliers are to be in possession of illegal drugs on the reserve at any time.
6. 3. Spot checks on contractor staff, sub contractors and their staff and suppliers for alcohol and drugs will be carried out routinely, this will include breathalyzer tests.

7. EKZN WILDLIFE STAFF LIVING QUARTERS

7. 1. The staff living quarters and all residential infra-structure in **Imfolozi Game Reserve** are out of bounds to contractor staff, sub contractors and their staff and suppliers.
7. 2. The private properties are out of bounds to contractor staff, sub contractors and their staff and suppliers.
7. 3. Contractor staff, sub contractors and their staff and suppliers found within any of these restricted areas will be removed from the park immediately and may be charged with trespassing.

8. RESORTS AND VISITORS

8. 1. No contractor staff, sub contractors and their staff and suppliers or may interfere with tourists or EKZN Wildlife staff at any time.
8. 2. No contractor staff, sub contractors and their staff and suppliers or may enter the Resorts or curio shop/tea garden area at any time.

9. ENTRY AND EXIT TO/FROM THE PARK

9. 1. The main entrance gate opens at 06h00 every morning and closes at 18h00 every evening.

9. 2. All contractor staff, sub contractors and their staff and suppliers that for some reason are on the park outside of these hours will respect these gate times.

9. 3. No contractor staff, sub contractors and their staff and suppliers will be allowed to enter or exit the park outside of the official gate times.

10. DISHONESTY

10. 1. No contractor staff, sub contractors and their staff and suppliers may give, receive or attempt to give or receive any bribe or induce or attempt to induce any person to perform any corrupt act.

10. 2. No contractor staff, sub contractors and their staff and suppliers may deliberately give untrue or misleading information or testimony, whether verbally or in writing.

10. 3. No contractor staff, sub contractors and their staff and suppliers or may falsify or change a document with fraudulent intent or attempt to do so.

10. 4. No contractor staff, sub contractors and their staff and suppliers may falsify any records or keep inaccurate records.

11. AREA OF OPERATION

11. 1. The area of operation for all contractor staff, sub contractors and their staff and suppliers will be the construction site and the entrance and exit road only.

11. 2. Any contractor staff, sub contractors and their staff and suppliers found in any other area of the park without authority or a valid reason will be removed from the park immediately and may be charged with trespassing.

12. GENERAL

12. 1. Contractor staff, sub contractors and their staff and suppliers found fighting with each other will be removed from station with immediate effect.

12. 2. Insubordination to the authority of the conservation manager of any form will not be tolerated.

12. 3. Spot checks will be carried out randomly during the day.

12. 4. No contractor staff, sub contractors and their staff and suppliers may be in possession of any weapon whilst on station. This includes firearms, knives, knob kierries or spears.

12. 5. Movement on the park at night is prohibited. Contractor staff, sub contractors and their staff and suppliers found moving around at night with or without vehicles will be removed from the park immediately and charged with trespassing.

12. 6. No contractor staff, sub contractors and their staff and suppliers are permitted to sell any products at any time including alcohol or drugs to any other person on station this includes EKZN Wildlife staff or members of the public.

12. 7. No contractor staff is permitted to have visitors while living within the reserve during the course of the project.

12. 8. Should the Contractor and contractor staff be found in contravention of any of the above mentioned rules they will no longer be permitted to live on site and will have to be commuted into the reserve every day at the Contractors expense.

13. DECLARATION.

I the undersigned have read or have been explained the entire document “Imfolozi Game Reserve contractor standing orders” and fully understand the contents of the said document.

I fully understand that in signing this standing order I take full responsibility of my staff, suppliers, sub-contractors or any other persons or group associated with my business within the Imfolozi Game Reserve.

I fully understand that if I contravene any provisions of the contractor standing orders, I may be liable to face immediate eviction from the Park and or cancellation of the contract.

Contractors name:

Signature:

Date:

Witness 1: Witness2:
EZEMVELO Project Manager

PART C: CONTRACT DATA

C1.1 CONTRACT DATA

CONTRACT DATA: JBCC 2000 PRINCIPAL BUILDING AGREEMENT (Edition 6.2 of May 2018)

The Conditions of Contract are clauses 1 to 30 of the JBCC Series 2000 Principal Building Agreement (Edition 6.2 of May 2018) prepared by the Joint Building Contracts Committee.

Copies of these conditions of contract may be obtained through most regional offices of the Association of South African Quantity Surveyors, Master Builders Association, South African Association of Consulting Engineers, South African Institute of Architects, Association of Construction Project Managers, Building Industries Federation South Africa, South African Property Owners Association or Specialist Engineering Contractors Committee.

A PROJECT INFORMATION

A 1.0 Works [1.1]

Project name	THE APPOINTMENT OF A CONTRACTOR FOR THE CONSTRUCTION OF NEW 2x 6 BED STAFF ACCOMMODATION UNITS AT MPILA CAMP IMFOLOZI GAME RESERVE
Reference number	BID NUMBER: EKZNW18/2022/23
Works description	THE CONSTRUCTION OF TWO NEW 6 BED STAFF ACCOMMODATION UNITS AND EXTERNAL WORKS AT MPILA CAMP

A 2.0 Site [1.1]

Erf / stand number	N/A
Township / Suburb	Hluhluwe
Site address	Mpila Camp, Imfolozi Game Reserve
Local authority	Umkhanyakude District Municipality

A 3.0 Employer [1.1]

Name	Ezemvelo KZN Wildlife		
Country	South Africa		
Employer's representative: Name	Mr. Glenn Harborth		
E-mail	Glenn.Harborth@kznmwildlife.com	Telephone number	+27(0) 33 845 1914
Postal address	Queen Elizabeth Park, 1 Peter Brown Drive, Montrose, Pietermaritzburg		
		Postal code	3201
Physical address	Queen Elizabeth Park, 1 Peter Brown Drive, Montrose, Pietermaritzburg		
		Postal code	3201

A 4.0 Principal agent [1.1]

Name	Rovert Consulting CC		
Legal entity of above	Rovert Consulting CC	Contact person	Farzana Kajee
Practice number	23721740	Telephone number	+27(0) 31 708 4001
		Mobile number	+27(0) 81 708 4001
Country		E-mail	Farzana@rovert.co.za
Postal address	P.O. Box 2177, Pinetown		
		Postal code	3600
Physical address	20 Stapleton Road, Pinetown,		
	Durban	Postal code	3601

A 5.0 Agent [1.1; 6.2]

Discipline Architect

Name	Glenn Harborth		
Legal entity of above	Ezemvelo KZN Wildlife	Contact person	Glenn Harborth
Practice number		Telephone number	+27(0) 33 845 1914
		Mobile number	-
Country	South Africa	E-mail	Glenn.Harborth@kznwildlife.com
Postal address	Queen Elizabeth Park, 1 Peter Brown Drive, Montrose, Pietermaritzburg		
		Postal code	3201
Physical address	Queen Elizabeth Park, 1 Peter Brown Drive, Montrose, Pietermaritzburg		
		Postal code	3201

A 6.0 Agent [1.1; 6.2]

Discipline Quantity Surveyor

Name	Rovert Consulting CC		
Legal entity of above	Rovert Consulting CC	Contact person	Farzana Kajee
Practice number	23721740	Telephone number	+27(0) 31 708 4001
		Mobile number	+27(0) 81 708 4001
Country	South Africa	E-mail	Farzana@rovert.co.za
Postal address	P.O. Box 2177, Pinetown		
		Postal code	3600
Physical address	20 Stapleton Road, Pinetown		
		Postal code	3610

A 7.0 Agent [1.1; 6.2]

Discipline Structural Engineer

Name	ART Consulting Enterprise (Pty) Ltd		
Legal entity of above	ART Consulting Enterprise (Pty) Ltd	Contact person	Reshay Takoordeen
Practice number	2019300663	Telephone number	+27(0) 31 464 0546
		Mobile number	+27(0) 83 743 9857
Country	South Africa	E-mail	Reshay@artce.co.za
Postal address	N/A		
		Postal code	
Physical address	N/A		
		Postal code	

A 8.0 Agent [1.1; 6.2] Discipline Civil Engineer

Name	ART Consulting Enterprise (Pty) Ltd		
Legal entity of above	ART Consulting Enterprise (Pty) Ltd	Contact person	Vishnu Rampersad Ulassi
Practice number	2019300663	Telephone number	+27(0) 83 786 9364
		Mobile number	+27(0) 83 786 9364
Country	South Africa	E-mail	Vishnu@ulassi.co.za
Postal address	N/A		
		Postal code	
Physical address	N/A		
		Postal code	

9.0 Agent [1.1; 6.2] Discipline Electrical Engineer

Name	DNA Consulting Engineers and Project Managers		
Legal entity of above	DNA Consulting Engineers and Project Managers	Contact person	Des Naidoo
Practice number		Telephone number	+27(0) 31 207 1576
		Mobile number	+27(0) 83 799 4568
Country		E-mail	Desn@dnaengineers.co.za
Postal address	635 Peter Mokaba Road, Morningside		
	Durban	Postal code	4001
Physical address	635 Peter Mokaba Road, Morningside		
	Durban	Postal code	4001

B CONTRACT INFORMATION

B 1.0 Definitions [1.1]

Bills of quantities: System/Method of measurement	Standard System of Measuring Building Work (sixth edition as amended)
--	---

B 2.0 Law, regulations and notices [2.0]

Law applicable to the works , state country [2.1]	The law applicable to this agreement shall be that of the: Republic of South Africa
---	---

B 3.0 Offer and acceptance [3.0]

Currency applicable to this agreement [3.2]	South African Rands (R)
--	---------------------------

B 4.0 Documents [5.0]

The original signed agreement is to be held by the principal agent [5.2], if not, indicate by whom	Employer
Number of copies of construction information issued to the contractor at no cost [5.6]	Three (3) copies of the construction documents will be supplied to the contractor free of charge
JBCC Engineering General Conditions are to be included in the contract documents:	NO

Documents comprising the agreement	Page numbers
---	--------------

The JBCC ® Principal Building Agreement, Edition 6.2 May 2018	1 to 30
The JBCC ® Principal Building Agreement - Contract Data , Edition 6.2 May 2018	1 to 14
The JBCC ® General Preliminaries for use with the JBCC ® Principal Building Agreement, Edition 6.2 May 2018	1 to 19

Contract drawings – description	Number	Revision	Date
Architectural			
1:500 Site Plan	001-017-wm-101	-	01/02/2021
1:200 Site Plan	001-017-wm-102	-	01/02/2021
Plans, Sections and Elevations	001-017-wm-201	B	01/02/2019
Door, Window, Finishes and SAN Schedules	001-017-ws-202	A	01/02/2019
Structural			
New Block A & B 6 Bedroom Staff Accommodation Foundation Layout and Details	033-ST-001-001-0.1	0.1	06/04/2021
New Block A & B 6 Bedroom Staff Accommodation Retaining Wall Layout and Details	033-ST-002-001-0.2	0.2	06/04/2021
Tank Stand Detail	033-ST-003-001-0.1	0.1	07/04/2021
Civil			
Project Specific Typical Details	033-CI-001-001-0.1	0.1	06/04/2021
Typical Stone Pitched Headwall Details	033-CI-001-002-0.1	0.1	06/04/2021
New Block A & B 6 Bedroom Staff Accommodation Sewer, Stormwater and Platform Layout	033-CI-003-001-0.2	0.2	07/04/2021
Electrical			
Plans, Sections & Elevations	001-013-ELE-002	D	14/02/2023
Electrical Site Plan	001-013-ELE-003	A	20/02/2023
Main LV Kiosk Schematic Diagram	001-013-ELE-004	C	17/02/2023

B 5.0 Employer's agents [6.0]

Authority is delegated to the following agents to issue contract instructions and perform duties for specific aspects of the works [6.2]
Principal Agent Architect Structural Engineer Civil Engineer Electrical Engineer
Principal agent's and agents' interest or involvement in the works other than a professional interest [6.3] - NONE

B 6.0 Insurances [10.0]

Insurances by Contractor		
Yes/no?	YES	
Contract works insurance[10.1.1; 10.2]:		Contract works insurance to be effected by the contractor To the minimum value of the contract sum plus 10% With a deductible not exceeding 5% of each and every claim
Supplementary insurance [10.1.2; 10.2]		Supplementary insurance is required: Yes To the minimum value of the contract sum plus 10 %
Public liability insurance [10.1.3; 10.2]		Public liability insurance to be effected by the contractor <input checked="" type="checkbox"/> For the sum of R 8 million With a deductible not exceeding 5% of each and every claim
Removal of lateral support insurance [10.1.4; 10.2]		N/A
Other insurances [10.1.5]		N/A
Yes/no?		If yes, description 1
Yes/no?		If yes, description 2

B 7.0 Obligations of the employer [12.1]

Existing premises will be in use and occupied [12.1.2]		Yes/no?	YES
If yes, description	Staff members employed at the Mpila Camp site will be active around the camp during the construction work hours.		
Restriction of working hours [12.1.2]		Yes/no?	Yes
If yes, description	<p>Working hours will be restricted to the times that the Game Reserve is operating.</p> <p>No work is permitted on Saturdays and Sundays.</p> <p>The contractor will not be allowed to be on site overnight and will need to travel into the Game Reserve every day. The contractor needs to ensure that he exits the Game Reserve by closing time.</p>		
Natural features and known services to be preserved by the contractor [12.1.3]		Yes/no?	YES
If yes, description	Refer to Environmental Management Plan		
Restrictions to the site or areas that the contractor may not occupy [12.1.4]		Yes/no?	YES
If yes, description	<p>The Contractor will be restricted to areas of work only.</p> <p>The Contractor will be required to provide hoarding to enclose his work area.</p>		
Supply of free issue [12.1.10]		Yes/no?	NO
If yes, description			

B 8.0 Nominated subcontractors [14.0]

Yes/no?	NO	If yes, description of specialization N/A
Specialisation 1		N/A
Specialisation 2		N/A
Specialisation 3		N/A
Specialisation 4		N/A
Specialisation 5		N/A

B 9.0 Selected subcontractors [15.0]

Yes/no?	NO	If yes, description of specialisation
Specialisation 1		N/A
Specialisation 2		N/A
Specialisation 3		N/A
Specialisation 4		N/A
Specialisation 5		N/A

B 10.0 Direct contractors [16.0]

Yes/no?	NO	If yes, description of extent of work
Extent of work [12.1.11]		N/A
Extent of work [12.1.11]		N/A
Extent of work [12.1.11]		N/A
Extent of work [12.1.11]		N/A
Extent of work [12.1.11]		N/A

B 10.0 Description of sections [20.1] – Not Applicable

Section 1	
Section 2	
Section 3	
Section 4	
Section 5	
Section 6	
Section	Remainder of the works

B 11.0 Possession of site [12.1.5], practical completion [19.0; 20.0] and penalty [24.0]

Practical completion for the works as a whole	Intended date of possession of the site [12.1.5]	Period for inspection by the principal agent [19.3]	The date for practical completion shall be the period as indicated below from the date of possession of the site by the contractor [12.2.7; 24.1]	Penalty for late completion [24.1]
	Date	working days	Period in months	Penalty amount per calendar day (excl. tax)
	To be Advised on Award	7 Days	10 Months	R 2 550.00

- Period for the commencement of the works after the contractor takes possession of the site: Ten (10) working days.
- For the works as a whole:

The date for practical completion shall be 10 (Ten) Months from the commencement date and the penalty per calendar day shall be R 2 550.00 excluding VAT.

Defects liability period [21.0]:

Extended defects liability period: Refer B15.0 [21.13]		Yes/no?	YES
If yes, description of applicable elements	13.1 All engineering work (12 months) 13.2 13.3 13.4 13.5 13.6		

B 12.0 Payment [25.0]

Date of month for issue of regular payment certificates [25.2]	By the 25 th of every month		
Contract price adjustment / Cost fluctuations [25.3.4; 26.9.5]	NOT APPLICABLE		
If yes, method to calculate			

B 13.0 Dispute resolution [30.0]

Dispute resolution of any dispute shall be conducted in the following chronologically order with litigation being last resort:

- 1 Negotiation
- 2 Mediation
- 3 Adjudication
- 4 Arbitration
- 5 litigation

B 14.0 JBCC® General Preliminaries - selections

Provisional bills of quantities [P2.2]	The quantities in provisional bills of quantities are an indication of the works to be executed and are subject to re-measurement
Availability of construction information [P2.3]	Where the construction information for the works is incomplete and will only be completed during the construction period the contractor and principal agent shall work together to identify the requirements for the provision of construction information. The contractor and principal agent shall agree the dates that are reasonable by when the contractor is to be provided with each outstanding item of the construction information in terms of the programme. The contractor and subcontractor shall agree dates by when the subcontractor is to be provided with each item of the outstanding information in terms of the programme
Previous work - dimensional accuracy - details of previous contract(s) [P3.1]	In successive contracts the contractor shall within ten per cent (10%) of the initial construction period or twenty (20) working days after taking possession of the site, whichever is the lesser, check the existing levels, lines, profiles and the like affecting the works and satisfy himself as to the dimensional accuracy of work previously executed. The contractor shall forthwith give notice to the principal agent and request a contract instruction regarding any dimensional inaccuracy found in work previously executed
Previous work - defects - details of previous contract(s) [P3.2]	N/A
Inspection of adjoining properties - details [P3.3]	Before commencing the works the principal agent and the contractor shall arrange with the owners of adjacent buildings and properties and representatives of local authorities to inspect, inter alia, the buildings, structures, pavings, kerbs, channels and fences. The contractor shall record all conditions that the works could affect and copy the principal agent accordingly. The contractor shall pay particular attention to cracks, defects and existing levels related to structures, pavings, kerbs, channels and fences which later could be claimed to have been caused or disturbed by the works Where

			instructed by the principal agent, levels and photographs shall be taken by the contractor and the cost thereof shall be for the employer's account. Certified copies shall be lodged with the principal agent
Handover of site in stages - specific requirements [P4.1]			N/A
Enclosure of the works - specific requirements [P4.2]			The contractor shall erect, maintain and remove at completion hoardings with gantries, fans, safety screens, elements thereof, all for the enclosure of the works from the public and others. The contractor needs to ensure that his enclosure is adequate as the site is within a Game Reserve.
Geotechnical and other investigations - specific requirements [P4.3]			N/A
Existing premises occupied - details [P4.5]			YES
Services - known - specific requirements [P4.6]			N/A
Water [P8.1]	By contractor	Yes	Water for construction purposes must be obtained from alternative water source/s (i.e. any supply other than water that is produced and distributed by a regulated water service authority from a licensed water treatment works for human consumption) - e.g. dams, rivers, boreholes, springs, rainwater harvesting, recycled sewage water, etc. The alternative water resource shall shall not be of an inferior quality standard than that required for construction purposes. The Contractor shall provide relevant certificates from an approved authority demonstrating the suitability of the water for construction purposes at his own expense, prior to usage for the works. Should this not be done, any consequential instructions to rectify or in any way occasioned as a result of the usage of non-approved water, shall be solely for the contractors account.
	By employer	No	
	By employer – metered	No	
Electricity [P8.2]	By contractor	Yes	
	By employer	No	
	By employer – metered	No	
Ablution and welfare facilities [P8.3]	By contractor	Yes	Ablution facilities shall be provided by the contractor as stated in the schedule and shall be provided for the use of all persons on the site. The contractor shall maintain such facilities in a thoroughly clean and tidy condition and make good damage thereto at his own expense.
	By employer	No	

Communication facilities - specific requirements [P8.4]	The contractor shall provide communication facilities as required for his staff as well as for the agents of the employer when on site and shall be liable for all costs related thereto.
Protection of the works - specific requirements [P11.1]	The contractor shall erect, maintain and remove at completion hoardings with gantries, fans, safety screens, elements thereof, all for the protection of the work, the public and others. Adequate protection of the works must be ensured by the contractor as the site is within a Game Reserve.
Protection / isolation of existing works and works occupied in sections - specific requirements [P11.2]	The contractor shall provide all reasonable temporary measures to protect/isolate the existing and/or sections of the occupied works and remove such measures on practical completion.
Disturbance - specific requirements [P11.5]	The contractor shall execute the works with a minimum of disturbance to adjoining premises, any parts of the works already handed over and the occupants of those premises and/or parts
Environmental disturbance - specific requirements [P11.6]	The contractor shall execute the works without any unreasonable adverse effect on the environment and ensure works are completed as per the requirements of environmental management plan.

B 15.0 Changes made to JBCC[®] documentation

Reference may be made to other documents forming part of this agreement
DEFINITIONS AND INTERPRETATION
<p>Clause 1.1 Definition of “Commencement Date” is added:</p> <p>“COMMENCEMENT DATE” means the date that the contractor acquires possession of the site, i.e. site handover, which will only occur after the agreement, made in terms of the Form of Offer and Acceptance, comes into effect</p> <p>Clause 1.1 Definition of “Guarantee for Construction” is amended by replacing it with the following:</p> <p>“GUARANTEE FOR CONSTRUCTION” means a guarantee at call obtained by the contractor from an institution approved by the employer in terms of the employer’s construction guarantee form as approved by the employer.</p> <p>Clause 1.1 Definition of “Construction Period” is amended by replacing it with the following:</p> <p>“CONSTRUCTION PERIOD” means the period commencing on the site handover date and ending on the date of practical completion</p> <p>Clause 1.1 Definition of “Corrupt Practice” is added:</p> <p>“CORRUPT PRACTICE” means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution.</p> <p>Clause 1.1 Definition of “Fraudulent Practice” is added:</p> <p>“FRAUDULENT PRACTICE” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of any tenderer and includes collusive practice among tenderers (prior to or after the tender submission) designed to establish tender prices at artificial non-competitive levels and to deprive the tenderer of the benefits of free and open competition</p>

Clause 1.1 Definition of "**Interest**" is amended by replacing it with the following:

"**INTEREST**" means the interest rates applicable on this contract, whether specifically indicated in the relevant clauses or not, will be the rate as determined by the Minister of Finance, from time to time, in terms of section 80(1)(b) of the Public Finance Management Act, 1999 (Act No. 1 of 1999)

Clause 1.1 Definition of "**Principal Agent**" is amended by replacing it with the following:

"**PRINCIPAL AGENT**" means the person or entity appointed by the **employer** and named in the **schedule** as such. In the event of a **principal agent** not being appointed, then all the duties and obligations of a **principal agent** as detailed in the **agreement** shall be fulfilled by a representative of the **employer** as named in the **schedule**

Clause 1.1 Definition of "**Security**" is amended by replacing it with the following:

"**SECURITY**" means the form of security provided by the **employer** or **contractor**, as stated in the **schedule**, from which the **contractor** or **employer** may recover expense or loss

Clause 1 is amended by the addition of the following:

Clause 1.2.6 If any provision of this **agreement**, which is not material to its efficacy as a whole, is rendered void, illegal or unenforceable in any respect under the law; the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired thereby and the parties shall endeavour in good faith to agree an alternative provision to the void, illegal or unenforceable provision.

Clause 1.2.7 No waiver or relaxation of any of the provisions or terms of this **agreement** (or any **agreement** or other document issued or executed pursuant to in terms of this **agreement**) shall operate as an estoppel against a party in respect of any of its rights in terms of this **agreement**

No failure by a party to enforce any provision of this **agreement** shall constitute a waiver of such provisions or affect in any way such party's right to require the performance of such provision at any time in the future, nor shall a waiver of a subsequent breach nullify the effectiveness of the provision itself.

Clause 1.2.8 If the contractor constitutes a joint venture, consortium or other unincorporated grouping of two or more persons:-

Clause 1.2.8.1 these persons are deemed to be jointly and severally liable to the **employer** for the performance of this **agreement**

Clause 1.2.8.2 these persons shall notify the **employer** of their leader who has authority to bind the **contractor** and each of these persons: and

Clause 1.2.8.3 the **contractor** shall not alter its composition or legal status without the prior written consent of the **employer**

Clause 1.2.9 The **contract documents** shall be taken to be mutually explanatory of one another but in the event of ambiguity, discrepancy, divergence or inconsistency in or between them, the JBCC Principal Building Agreement as the special conditions shall prevail over all other **contract documents**.

LAW, REGULATIONS AND NOTICES

Clause 2.0

Note: A separate clause has been included in Section C: Specific Preliminaries of the **bills of quantities** 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 and baseline risk assesment.

Clause 2.4.2 is amended by replacing it with the following

No clause

Clause 2.0 is amended by the addition of the following:-

Clause 2.5 The contractor shall take all reasonable precautions to maintain the health and safety of persons in and about the execution of the **works**. Without limitation the contractor hereby:

Clause 2.5.1 accepts that the **employer** will appoint him as the **Principal Contractor** (as defined and provided for under the Construction Regulations 2014 (as amended) and promulgated under the Occupational Health and Safety Act 85 of 1993 (as amended) for the site

Clause 2.5.2 acknowledges and confirms that the **contract sum** includes a sufficient amount for proper compliance with the **employer's** health and safety specification, the construction regulations, all applicable health and safety laws and regulations and the health and safety rules, guidelines and procedures provided for in this **agreement** and generally for the proper maintenance of health and safety in and about the execution of the works including all materials, labour, training, equipment and all other requirements necessary to ensure proper and complete health and safety implementation and management on site in accordance with applicable legislation; and

Clause 2.5.3 undertakes, in and about the execution of the **works**, to comply with the Construction Regulations and with all applicable health and safety laws and regulations and rules and guidelines and procedures otherwise provided for under the **agreement** and shall ensure that all **sub-contractors**, employees and others under the **contractor's** direction and control, likewise observe and comply with the foregoing.

Clause 2.6 The **employer** reserves the right to pay direct (i.e) not through the **contractor** for all or any permanent connections to local or other authority services, for which provisional amounts have been included within the **contract documents**. In the event of the **employer** paying direct for these charges, the **contractor** will not be entitled to a ten per cent (10%) mark-up in terms of clause 32.4. All such provisional amounts included in the **contract sum** will, as a result, be omitted

OFFER AND ACCEPTANCE

Clause 3.0

Clause 3.2 is amended by replacing it with the following

Clause 3.2 The currency applicable to this agreement is South African Rands.

CESSION AND ASSIGNMENT

Clause 4.0

DOCUMENTS

Clause 5.0

Clause 5.0 is amended by the addition of the following:

Clause 5.7 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

EMPLOYER'S AGENTS

Clause 6.0

Clause 6.1. is amended to include clauses 26.8, 26.12 and 26.13 in terms of which the **employer** has retained its authority and has not given a mandate to the **Principal Agent** and in terms of which the **employer** shall sign all documents.

DESIGN RESPONSIBILITY

Clause 7.0 : DESIGN RESPONSIBILITY

Clause 7.1 is amended by the addition of the following:

Notwithstanding the provisions of clause 7.2, where the **contractor** undertakes the design responsibility of any aspect of the **works**, he shall indemnify and hold free the **employer** and his **agents** from responsibility for any claim or proceeding whatsoever due to any fault including fault in the design detailing and calculations. In respect of the design responsibility undertaken by any **nominated or selected sub-contractor**, such **sub-contractor** shall similarly, indemnify and hold free the **employer**, his **agents** and the **contractor** from responsibility for any claim or proceeding whatsoever due to any fault including fault in the design, detailing and calculations except where such **sub-contractor** is from the **mandatory partner** in which case the liability shall vest in the **contractor**.

Clause 7.0 is amended by the addition of the following:-

Clause 7.4 Without limiting or derogating from the employers rights under sub-clause 7.2, the contractor shall;

Clause 7.4.1 ensure that every **n/s or selected sub-contractor**, simultaneously with the signing of the relevant **n/s agreement**, signs (in terms of a written signing authority acceptable to the **principal agent**) and delivers to the **employer** a design, materials and workmanship warranty and undertaking (design warranty) in favour of the **employer**.

Clause 7.4.2 provide the **employer** evidence of suitable and sufficient professional indemnity insurance for all **sub-contractors** whose **subcontract** involves design work other than for temporary works.

Clause 7.5 pending delivery of the design warranty and the required evidence of the professional indemnity insurance **contractor** shall, notwithstanding anything to the contrary in the **agreement** and without limiting or derogating from the **employer's** rights under sub-clause 7.2, be responsible for issues that may arise, and pertaining to the relevant **sub-contract works**.

INSURANCE AND SECURITIES

WORKS RISK

Clause 8.0

Clause 8.5.1 is amended to read as follows:

The use or occupation, after **practical completion**, of any part of the **works** by the **employer**, the **employer's** servants or **agents**; and those for whose acts or omissions they are responsible.

INDEMNITIES

Clause 9.0

INSURANCES

Clause 10.0 is amended by the addition of the following:-

10.11.1 Damage to the Works

(a) Without in any way limiting the **contractor's** obligations in terms of the contract, the **contractor** shall bear the full risk of damage to and/or destruction of the **works** by whatever cause during construction of the **works** and hereby indemnifies and holds harmless the **employer** against any such damage. The **contractor** shall take such precautions and security measures and other steps for the protection and security of the **works** as the **contractor** may deem necessary

(b) The **contractor** shall at all times proceed immediately to remove or dispose of any debris arising from damage to or destruction of the **works** and to rebuild, restore, replace and/or repair the **works**

(c) The **employer** shall carry the risk of damage to or destruction of the **works** and materials paid for by the **employer** that is the result of the excepted risks as set out in 10.6

(d) Where the **employer** bears the risk in terms of this contract, the **contractor** shall, if requested to do so, reinstate any damage or destroyed portions of the **works** and the costs of such reinstatement shall be measured and valued in terms of 32.0 hereof

10.12 Injury to Persons or loss of or damage to Properties

(a) The **contractor** shall be liable for and hereby indemnifies the **employer** against any liability, loss, claim or proceeding whether arising in common law or by statute, consequent upon personal injuries to or the death of any person whomsoever arising out of or in the course of or caused by the execution of the **works** unless due to any act or negligence of any person for whose actions the **employer** is legally liable

(b) The **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

(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**

(d) The **contractor** shall be responsible for the protection and safety of such portions of the premises placed under his control by the **employer** for the purpose of executing the **works** until the issue of the **certificate of practical completion**

(e) Where the execution of the **works** involves the risk of removal of or interference with support to adjoining properties including land or structures or any structures to be altered or added to, the **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

(f) The **contractor** shall at all times proceed immediately at his own cost to remove or dispose of any debris and to rebuild, restore, replace and/or repair such property and to execute the **works**

10.13 High risk insurance

In the event of the project being executed in a geological area classified as a "High Risk Area", that is an area which is subject to highly unstable subsurface conditions that might result in catastrophic ground movement evident by sinkhole or doline formation the following will apply:

10.13.1 Damage to the works

The **contractor** shall, from the **commencement date** of the **works** until the date of the **certificate of practical completion** bear the full risk of and hereby indemnifies and holds harmless the **employer** against any damage to and/or destruction of the **works** consequent upon a catastrophic ground movement as mentioned above. The **contractor** shall take such precautions and security measures and other steps for the protection of the **works** as he may deem necessary

When so instructed to do so by the **principal agent**, the **contractor** shall proceed immediately to remove and/or dispose of any debris arising from damage to or destruction of the **works** and to rebuild, restore, replace and/or repair the **works**, at the **contractor's** own costs

10.13.2 Injury to persons or loss of or damage to property

The **contractor** shall be liable for and hereby indemnifies and holds harmless the **employer** against any liability, loss, claim or proceeding arising at any time during the period of the contract whether arising in common law or by statute, consequent upon personal injuries to or the death of any person whomsoever resulting from, arising out of, or caused by a catastrophic ground movement as mentioned above

The **contractor** shall be liable for and hereby indemnifies the **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

10.13.3 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 fifteen (15) **working days** of the **commencement date** but before commencement of the **works**, submit to the **employer** proof of such insurance policy, if requested to do so

10.13.4 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

SECURITY

Clause 11.0 is amended by deleting clauses 11.1 - 11.8 and replacing them with the following:

11.1.1 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 fifteen (15) working days from commencement date

11.1.1.2 Within fifteen (15) working 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

11.1.1.3 Within fifteen (15) working 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

11.1.1.4 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

11.1.1.5 The employer shall be entitled to recover expense and loss from the cash deposit in terms of 27.0 provided that the employer complies with the provisions of 27.3.1 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

11.1.1.6 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

11.1.1.7 Where security as a variable construction guarantee of ten per cent (10%) of the contract sum (excluding VAT) has been selected:

11.1.1.7.a 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 fifteen (15) working days from commencement date

11.1.1.7.b The variable construction guarantee shall reduce and expire in terms of the Variable Construction Guarantee form included in the invitation to tender

11.1.1.7.c The employer shall return the variable construction guarantee to the contractor within fourteen (14) calendar days of it expiring

11.1.1.7.d Where the employer has a right of recovery against the contractor in terms of 27.0, the employer shall issue a written demand in terms of the fixed or variable construction guarantee

11.1.1.8 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:

11.1.1.8.a 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)

11.1.1.8.b 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

11.1.1.8.c The employer shall return the fixed construction guarantee to the contractor within fourteen (14) calendar days of it expiring

11.1.1.9 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

Clause 11.11 In the event that the value of the works (excluding adjustments in terms of the contract price adjustment provisions) increases during the course of the contract by an amount of ten per cent (10%) or more of the contract sum, then upon written request from the principal agent, the contractor

shall, within ten (10) working days of such request arrange to have the construction guarantee guaranteed sum increased accordingly. The approved cost of increasing the construction guarantee shall be added to the contract sum. If the contractor is so required to increase the guaranteed sum, no further amounts shall be certified or paid to the contractor until the guarantee has been increased.

Should the **contractor** be a joint venture, then each entity shall be jointly and severably liable to the **employer** for all obligations and liabilities in terms of this **agreement**. The amount so claimed against and paid under the **construction guarantee** shall be reimbursed to the **contractor** if and when the **construction guarantee** is reinstated, extended or substituted in compliance with the above (as the case may be) and the **principal agent** shall forthwith issue a **payment certificate** certifying the amount so due to the **contractor**.

EXECUTION

OBLIGATION OF THE PARTIES

Clause 12.0

Clause 12.1.5 is amended by replacing it with the following clause:

Give the **contractor** possession of the **site** within ten (10) **working days** of the **contractor** complying with the terms of 12.2.22

Clause 12.2.3 is deleted in its entirety and replaced with the following clause:

The security selected in terms of 11.0, as amended

Clause 12.2 is amended by the addition of the following clause:

12.2.22 An acceptable health and safety plan, required in terms of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), within fifteen (15) **working days of commencement date**

Clause 12.0 is amended by the addition of the following:

12.4 Programme

12.4.1 This programme shall include 3 **working days** per contract period for inclement weather which shall include but not be limited to, wind and rain delays. Such provisions shall be monitored by the **contractor** and agreed with the **principal agent** as and when such inclement weather takes place and shall be recorded in the **programme** based on actual stoppages when incurred

12.4.2 Notwithstanding the fact that the **programme** has been prepared in conjunction with the **principal agent**, the **contractor** shall be responsible at all times for maintaining the accuracy, validity and reasonableness of the **programme**, and the implementation thereof.

12.4.3 The **programme** shall be compiled based on the critical path method of programming and the critical activities are to be clearly highlighted. It shall be compiled in such a way that logic is not constrained by resource limitations unless specifically agreed otherwise by the **principal agent**.

The **programme** will be processed on the **principal agent's** system and the **contractor** shall provide all the co-operation necessary to achieve this.

12.4.4 Documentation will not be available in complete detail at the commencement stage. However the **contractor**, in conjunction with the **principal agent**, shall plan the works on provisional information, to an agreed level of detail relating to the level of detailed information available and with sufficient scope to include future detail without disrupting the basic logic as initially agreed.

For programming purposes, it shall be assumed that the quantities contained in the **bills of quantities** are provisional and thus shall be utilized as a guide only for the drawing up of the **programme**.

Where assumptions are made in regard to programming aspects, such assumptions shall be agreed by the **contractor** and the **principal agent**, and suitably recorded in the **programme**.

12.4.5 Should circumstances change to the extent where the **contractor** is of the opinion that changes to the **programme** are required, then the **contractor** shall submit a written request to the **principal agent** for such changes, clearly identifying the reasons for requiring such change. The **contractor** and **principal agent** shall thereafter agree such changes, if any, and any costs related thereto as per the principles espoused in 15.5.1 above.

Should the **principal agent** be of the opinion that the **programme** requires revisions, and notwithstanding the fact that a request for such revision has not been received from the **contractor**, the **principal agent** shall be entitled to instruct the **contractor** to revise the **programme** accordingly, unless the **contractor** can submit reasonable justification for not doing so.

Any acceleration and/or special measures sanctioned by the **principal agent** together with associated effects shall be incorporated in a revision to the programme.

12.4.6 The **contractor** and the **principal agent** shall, at regular intervals not exceeding 14 (fourteen) **calendar days**, agree the state of progress of the **works** relative to the latest agreed revision of the **programme**. Such **agreement** shall include the recording of actual commencement and **completion** dates for each activity and shall constitute the official record of the progress at such point in time.

12.4.7 In addition to and based on the **programme** systems and format dictated above, the **contractor** shall devise detailed working **programmes**. These shall be drawn on a regular basis (at least monthly), to the satisfaction of the **principal agent**.

Such working **programmes** shall at all times relate to the constraints of the current **programme**.

12.4.8 **Contract instructions** shall be issued in accordance with clause 17, as amended.

SETTING OUT OF THE WORKS

The following sub-clauses are hereby added to this clause:-

13.3 The **contractor** shall provide general attendance and all reasonable assistance to the employer's appointed land surveyor, or any other land surveyor who may be appointed by the **employer**.

13.4 The **contractor** shall perform tolerance control checks regularly throughout the **construction period** and report on these at regular intervals to the **principal agent** in a format approved by the **principal agent**. Should the **contractor** fail to comply with this requirement to the satisfaction of the **principal agent**, progressively as the structure is constructed, the **employer** shall be entitled to commission a registered land surveyor to do so on the **contractor's** behalf and at the **contractor's** expense

NOMINATED SUBCONTRACTORS

Clause 14.0

Clause 14.1.5 is amended by replacing it with the following:

No clause

Note: See item B9.1 and B9.2 hereinafter for adjustment of attendance on **nominated subcontractors** executing work allowed for under provisional sums. Notwithstanding anything to the contrary contained in the **agreement**, the contractor shall be aware that profit and attendance shall only be certified once in respect of each provisional sum.

SELECTED SUBCONTRACTORS

Clause 15.0

The **contractor** cannot exclude the sub-contract **tendered works** from his responsibility, after the **selected sub-contractor** has been accepted, subject to the **tendered** conditions being met.

Clause 15.1.5 is deleted and replaced by the following :-

Advance payment on **selected sub-contracts**, will not be effected.

Clause 15.0 is amended by the addition of the following:

Clause 15.9 The **contractor** will provide specific provisions regarding the use of all plant, equipment and services allowed for the various **sub-contractors**, to ensure comprehensive pricing by such **sub-contractors**. The relevant amendments to the **sub-contract tender** documents are to be clearly identified by the **contractor** and included in the **sub-contract tender** documentation and **agreements** to be signed with each of the **sub-contractor** and as such, the **contractor** shall be fully responsible for the management and cost of such **sub-contracts**.

EMPLOYER'S DIRECT CONTRACTORS

Clause 16.0

CONTRACT INSTRUCTIONS

Clause 17.0

Clause 17.1 is amended by the addition of the following:

Clause 17.1.21 Changes to the sequence and timing of the works.

Clause 17.1.22 Acceleration (irrespective of whether or not the **principal agent** rules that the **contractor** is entitled to a revision of the date for **practical completion**, but provided that a **contract instruction** to accelerate may not, unless at a time when it would not be reasonable for an experienced **contractor** to achieve the required acceleration given the available remaining period).

COMPLETION

INTERIM COMPLETION

Clause 18.0

PRACTICAL COMPLETION

Clause 19.1 shall be amended by the addition of the following clause:

19.1.3 In order to achieve **practical completion** of the **works** and without derogating from the generality of the term **practical completion**, the **contractor** shall, as a minimum comply with the following basic criteria. These criteria should not be regarded as comprehensive but as an expansion of the term **practical completion**.

19.1.3.1 In regard to the **completion** date applicable to the **works**, the following shall apply:

(i) Access to all Areas

At the date of **practical completion** all areas, external access areas and the like must be fully complete with unobstructed access in every respect. This includes the roadways from perimeter of site to the basement, driveway access through basements and including the following:

- a) All emergency fire, traffic and signage.
- b) Road markings.
- c) Permanent lighting and power to all roadways, basement driveways, guardhouses and driveway gates.
- d) All fire escape routes and staircases complete and free of any obstructions.

ii) External Facades

At the date of practical completion, the external facade including balconies must be fully complete in every respect including the following:

- a) All facade surfaces must be painted, polished or cleaned where required and must be free of any builder's debris, marks or scratches
- b) Fully operational and commissioned permanent power and lighting
- c) All doors and gates complete with all ironmongery and lock sets with keys for handover
- d) Screed and tiling to falls tested and corrected as necessary prior to hand over
- e) Roofs completed and waterproofed.
- f) All finishes to be de-snagged and complete to ensure that scaffolding is removed from sidewalks

iii) Security

a) All areas to be handed over must be secure, doors fitted and lockable, windows glazed and all security and access control systems to be operative. All shop fronts and windows must be lockable with ironmongery fitted and keys marked and tagged for handover. After practical completion no person shall be allowed to access the facilities without prior consent by the occupants or management.

iv) Electrical

a) Electrical installation is to be completed and fully commissioned - permanent power and lighting inclusive of all telephone and data installations.

v) Plumbing installation

a) Plumbing installation it to be complete, commissioned / permanent water supply and drainage tested. Pipe work to be pressured tested.

vi) External sewer, drainage and storm water connection

a) All sewer, drainage and storm-water systems must have been completed and inspected and signed off.

vii) Floors, ceilings, kitchen cabinets, appliances, Cupboards, joinery, shop fitting, shower and general finishes

a) Completed and finished in accordance with Architect's layouts, interiors specifications and schedules. All appliances and equipment to be installed, connected, commissioned and tested.

viii) General

a) All certificates required to obtain an Occupancy Certificate from the Municipality Building Inspectorate in accordance with the National Building Regulations to be provided.

b) Approved building plans from the Municipality to be provided.

ix) Structural/Civil Works

Clause 19 is amended by the addition of the following:

19.8 Without derogating from the generality of the requirements of **practical completion** the following specific requirements shall apply:-

19.8.1 All items on the **practical completion** list must be completed and attended to in their entirety.

19.8.2 All defects noted on the quality control sheets issued by the **principal agent** during the currency of the **contract** are to have been completed and attended to in their entirety.

19.8.3 The following certificates of compliance shall be required (excluding others that may be required by the local/national authority) from the **contractor** to achieve **practical completion**:

- a) A certificate from the contractor that all aspects of the construction regulations of 2014 have been complied with.
- b) A certificate from the contractor that the National Building Regulations have been complied with.
- c) IOPSA (Institute of Plumbing South Africa) Certificate/s of compliance with respect to plumbing and drainage.
- d) Electrical certificates of compliance.
- e) Lightning protection certificates of compliance
- f) Certificate/s of compliance and fire certificate/s from the **contractor** and fire chief respectively.
- g) Certificate/s of compliance in respect of termite proofing
- h) Waterproofing guarantee/s
- i) Certificate/s of compliance with respect to all glazing.
- j) Soil poisoning certificate/s
- k) Soil compaction certificate/s

- l) TR1 and TR2 certificates in respect of timber roof construction
- m) Certificate/s of compliance in respect to galvanising of structural steelwork
- n) Glazing certificate/s

Note: The above list is not exhaustive and the contractor will be required to provide all further certificates/guarantees as requested by the **principal agent**

19.8.4 A complete set of maintenance and operating manuals together with all workmanship and material warranties and guarantees are to be compiled and issued to the **principal agent** prior to achievement of **practical completion**.

19.8.5 All relevant test results i.e. concrete test cube, compaction, density etc. are to be produced in hard copy, in a file, clearly referenced with a covering summary sheet. These results to be from an independent geotechnical testing laboratory and not from the concrete suppliers batching plant

19.8.6 Complete Method Statements and motivations for any works that the Contractor proposes conducting that do not directly and completely align with the requirements as set out in the Contract documentation.

19.8.7 A quality control file for all civil and structural engineering works done by the Contractors QC/QA team and signed off by the Engineer at each stage during the project should include :

- Pre and post concrete and reinforcing inspections
- Pressure testing pipe results signed off by a registered plumber and
- Inspection sheets of Engineers
- All tests, namely, Mod, CBR, Indicator, DCP and Density tests

COMPLETION IN SECTIONS - NA

Clause 20.0

DEFECTS LIABILITY PERIOD AND FINAL COMPLETION

Clause 21.0

Clause 21.0 is amended by the addition of the following:

Clause 21.13 The **contractor** shall attend to defects during the **defects liability** period on a progressive basis, to the satisfaction of the **principal agent**, and will not be permitted to wait until the end of the **defects liability** period or until the amount of **defects** accumulates in order to attend to a comprehensive list of **defects**.

LATENT DEFECTS LIABILITY PERIOD

Clause 22.0

Clause 22.0 is amended by the addition of the following:

22.4 The **contractor** shall make good all defects that appear up to the date of **final completion** and shall make good all latent defects that become patent and are notified to the **contractor** prior to the expiry of the latent **defects liability** period.

Clause 22.5 Any water leakage into the building, either in the roof, external wall or other element of building susceptible to water leakage shall unless proved to be a design defect, damaged caused by the **employer** or **employer's end user** , damage arising from theft of vandalism or inadequate maintenance not in accordance with the submitted and accepted guidelines, be deemed a latent defect.

REVISION OF DATE FOR PRACTICAL COMPLETION

Clause 23.0

Clause 23.1.1 is amended by the addition of the following:

Clause 23.0 is amended by the addition of the following:-

Clause 23.9 No revision to the date for **practical completion** shall be considered unless the **contractor** demonstrates, to the reasonable satisfaction of the **principal agent** and on the basis of the current **programme** or other **programme** acceptable to the **principal agent** for this purpose, that the delay is on the critical path to **practical completion** of the **works**.

Clause 23.10 The removal and replacement of materials and/or workmanship that do not conform to specification or drawings shall not constitute grounds for a revision of the date for **practical completion** nor for any adjustment of the **contract value**.

Clause 23.11 If the **contractor** is instructed to accelerate, the **contractor** shall promptly take necessary steps to ensure that the **works** are completed timeously, including the provision by him of additional resources, plant, manpower, etc. and the working overtime or additional overtime beyond that contemplated at the time of **tender** (at all times adhering to the regulations and requirements of all authorities) and by all other adequate and proper means and methods. The **contractor** shall prove that such steps are being taken if called upon to do so.

Clause 23.0 is amended by the addition of the following:-

Clause 23.9 No revision to the date for **practical completion** shall be considered unless the **contractor** demonstrates, to the reasonable satisfaction of the **principal agent** and on the basis of the current **programme** or other **programme** acceptable to the **principal agent** for this purpose, that the delay is on the critical path to **practical completion** of the **works**.

Clause 23.10 The removal and replacement of materials and/or workmanship that do not conform to specification or drawings shall not constitute grounds for a revision of the date for **practical completion** nor for any adjustment of the **contract value**.

Clause 23.11 If the **contractor** is instructed to accelerate, the **contractor** shall promptly take necessary steps to ensure that the **works** are completed timeously, including the provision by him of additional resources, plant, manpower, etc. and the working overtime or additional overtime beyond that contemplated at the time of **tender** (at all times adhering to the regulations and requirements of all authorities) and by all other adequate and proper means and methods. The **contractor** shall prove that such steps are being taken if called upon to do so.

Clause 23.12 Notwithstanding anything to the contrary the **contractor** shall not be entitled to a revision of the date for **practical completion** for delays arising from municipal, Eskom or other interruption in energy supply to the **site**.

PENALTY FOR LATE AND NON-COMPLETION

Clause 24.0

PAYMENT

Clause 25.0

Clause 25.3.3 is amended by replacing "11.1.2;11.4.1" with "11.0 as amended"

Clause 25.5 replaced with the following:-

"Where stored off the **site**, covered by an advance payment guarantee issued by a registered bank approved by the **principal agent** and submitted with the **contractor's** progress claim. Failure to include the advance **payment guarantee** with the contractor's progress claim will result in the value of the **materials and goods** being omitted from the amount certified for payment.

ADJUSTMENT TO THE CONTRACT VALUE AND FINAL ACCOUNT

Clause 26.0

Clause 26.6 is amended by the addition of the following at the end of the sentence:-

26.6 - The **contractor** shall within forty (40) **working days** of the delay ceasing, submit details of the expense and loss to the **principal agent** failing which the **contractor** shall forfeit such claim.

Clause 26.0 is amended by the addition of the following:-

Clause 26.14 Where prices are submitted by the **contractor** or **n/s subcontractor** during the progress of the works in respect of **contract instructions** or in regard to a claim under the terms of the **agreement** or in respect to provisional sums or budgetary allowances and notwithstanding the fact that such prices may be used in an interim **payment certificate**, there shall be no presumption of acceptance. Should the **principal agent** wish to accept any such prices prior to the issue of the final **payment certificate**, such acceptance shall be in writing.

Clause 26.15 The **contractor** shall not receive any mark-up for overheads and profit on any omission of tenant installation work or tenant installation work by **direct contractors** and others, except where pricing is allowed for in the Bills of Quantities. Claims for loss of profit shall not be entertained.

RECOVERY OF EXPENSE AND LOSS

Clause 27.0

Clause 27.0 is amended by deleting clauses 27.3 - 27.4 and replacing them with the following:

27.3.1 Where the employer decides to recover an amount due in terms of 27.3 from a payment reduction applied in terms of 11.1.1.5, the employer shall notify the contractor and the principal agent thereof. Should such amount not be paid to the employer within seven (7) calendar days of the date of receipt of such a notice by the contractor, the employer may recover such an amount from the security.

27.3.2 Where the employer decides to recover an amount due in terms in terms of 27.3 from a construction guarantee or advance payment guarantee held as security, the employer shall issue a written demand to the contractor in terms of such guarantees.

27.4 Where a provisional sequestration or provisional liquidation order has been granted or where an order has been granted which commences sequestration, liquidation, bankruptcy, receivership, winding-up or any similar effect against the contractor or this agreement is cancelled in terms of 29.0, the employer may issue a demand to the guarantor in terms of the construction guarantee or advance payment guarantee held as security.

SUSPENSION AND TERMINATION

SUSPENSION BY THE CONTRACTOR

Clause 28.0

TERMINATION

Clause 29.0

Clause 29.1 is amended by the addition of the following clauses:

29.1.4 refuses or neglects to comply strictly with any of the conditions of contract

29.1.5 estate being sequestrated, liquidated or surrendered in terms of the insolvency laws in force within the Republic of South Africa

29.1.6 in the judgement of the **employer**, has engaged in **corrupt** or **fraudulent practices** in competing for or in executing the contract

Clause 29.3 is amended by adding :

"The **employer** (through instruction to the **principal agent**) may furthermore terminate this **agreement** by giving written notice of termination where:-

(i) the **contractor** becomes bankrupt or insolvent (commercially or otherwise),

(ii) an application is made, or a resolution is adopted, for the winding-up of the **contractor** (whether provisional or final)

(iii) business rescue proceedings have commenced in respect of the contractor in accordance with the Companies Act, 71 of 2008 (as amended) ("the Companies Act"), or

(iv) the **contractor** proposes or effects an offer of compromise with the **contractor's** creditors in accordance with section 155 of the Companies Act or begins negotiations or takes any other step with a view to generally deferring, re-scheduling or otherwise re-adjusting all or a material part of the **contractor's** indebtedness or proposes or makes a general scheme, arrangement or composition with or for the benefit of the **contractor's** creditors or a moratorium is proposed or agreed in respect of or affecting all or a material part of the **contractor's** indebtedness.

Note: In the case of a Joint Venture or Consortium, the **employer** shall have the right to proceed with cancellation in terms of Clause 36 (as amended) where a minimum of one (1) party to the Joint Venture or Consortium is in default.

Clause 29.0 is amended by the addition of the following clause:

29.29 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

Clause 29.25.4 is amended by replacing "sixty (60)" with "one hundred and twenty (120)"

Clause 29.0 is amended by the addition of the following sub-clauses:

Clause 29.30 "Where the **employer** does not receive the requisite local authority approvals (to the **employer's** satisfaction) for the construction of the permanent works at the **site**".

29.31 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

29.32 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

DISPUTE RESOLUTION

DISPUTE RESOLUTION

Clause 30.0

Clause 30.3 - Replace "ten (10)" with "fifteen (15)"

C TENDER CLOSING

Tender Closing Date	31 May 2023	Time	11:00
Tender Submission Address	Ezemvelo KZN Wildlife Head Office, Queen Elizabeth Park, No.1 Peter Brown Drive, Montrose, Pietermaritzburg, 3202		

D TENDERER'S SELECTIONS

D 1.0 Securities [11.0]

Guarantee for construction: Select Option A or B

Option A	Guarantee for construction (variable) by contractor [11.1.1]
Option B	Guarantee for construction (fixed) by contractor [11.1.2]
Guarantee for payment by employer [11.5.1; 11.10]	Not applicable
Advance payment, subject to a guarantee for advance payment [11.2.2; 11.3]	Not applicable

D 2.0 Contractor's annual holiday periods during the construction period

Year 1 contractor's annual holiday period	start date	13/12/2023	end date	05/01/2024
Year 2 contractor's annual holiday period	start date	18/12/2024	end date	10/01/2025
Year 3 contractor's annual holiday period	start date	17/12/2025	end date	09/01/2026

D 3.0 Payment of preliminaries [25.0]

Option A or B A

Option A shall apply

Payment methods

Option A	The preliminaries shall be paid in accordance with an amount prorated to the value of the works executed in the same ratio as the amount of the preliminaries to the contract sum , which contract sum shall exclude the amount of preliminaries . Contingency sum(s) and any provision for cost fluctuations shall be excluded for the calculation of the aforesaid ratio
Option B	The preliminaries shall be paid in accordance with an amount agreed by the principal agent and the contractor in terms of the priced document to identify an initial establishment charge, a time-related charge and a final dis-establishment charge. Payment of the time-related charge shall be assessed by the principal agent and adjusted from time to time as may be necessary to take into account the rate of progress of the works

Lump sum contract

Where the amount of **preliminaries** is not provided it shall be taken as 7.5% (seven and a half per cent) of the contract sum, excluding contingency sum(s) and any provision for cost fluctuations

D 4.0 Adjustment of preliminaries [26.9.4]

Option A or B A

Option A shall apply

Provision of particulars

The **contractor** shall provide the particulars for the purpose of the adjustment of **preliminaries** in terms of his selection. Where completion in **sections** is required, the **contractor** shall provide an apportionment of **preliminaries** per **section**

Option A	An allocation of the preliminaries amounts into Fixed, Value-related and Time-related amounts as defined for adjustment method Option A below, within fifteen (15) working days of the date of acceptance of the tender
Option B	A detailed breakdown of the preliminaries amounts within fifteen (15) working days of possession of the site . Such breakdown shall include, inter alia, the administrative and supervisory staff, the use of construction equipment , establishment and dis-establishment charges, insurances and guarantees, all in terms of the programme

Adjustment methods

The amount of preliminaries shall be adjusted to take account of the effect which changes in time and/or value have on preliminaries. Such adjustment shall be based on the particulars provided by the contractor for this purpose in terms of Options A or B, shall preclude any further adjustment of the amount of preliminaries and shall apply notwithstanding the actual employment of resources by the contractor in the execution of the works

Option A	<p>The preliminaries shall be adjusted in accordance with the allocation of preliminaries amounts provided by the contractor, apportioned to sections where completion in sections is required</p> <p>Fixed - An amount which shall not be varied</p> <p>Value-related - An amount varied in proportion to the contract value as compared to the contract sum. Both the contract sum and the contract value shall exclude the amount of preliminaries, contingency sum(s) and any provision for cost fluctuations</p> <p>Time-related - An amount varied in proportion to the number of calendar days extension to the date of practical completion to which the contractor is entitled with an adjustment of the contract value [23.2; 23.3] as compared to the number of calendar days in the initial construction period [26.9.4]</p>
Option B	<p>The adjustment of preliminaries shall be based on the number of calendar days extension to the date of practical completion to which the contractor is entitled with an adjustment of the contract value [23.2; 23.3] as compared to the number of calendar days in the initial construction period [26.9.4]</p> <p>The adjustment shall take into account the resources as set out in the detailed breakdown of the preliminaries for the period of construction during which the delay occurred</p>

Failure to provide particulars within the period stated

Option A	<p>Where the allocation of preliminaries amounts for Option A is not provided, the following allocation of preliminaries amounts shall apply:</p> <p>Fixed - Ten per cent (10%) Value-related - Fifteen per cent (15%) Time-related - Seventy-five per cent (75%)</p> <p>Where the apportionment of the preliminaries per section is not provided, the categorised amounts shall be prorated to the cost of each section within the contract sum as determined by the principal agent</p>
Option B	<p>Where the detailed breakdown of preliminaries amounts for Option B is not provided, Option A shall apply</p>

Lump sum contract

Where the amount of preliminaries is not provided it shall be taken as 7.5% (seven and a half per cent) of the contract sum, excluding contingency sum(s) and any provision for cost fluctuations

C1.2 FORM OF GUARANTEE

FIXED CONSTRUCTION GUARANTEE - JBCC 2000 PRINCIPAL BUILDING AGREEMENT (Edition 6.2 of May 2018)

FIXED CONSTRUCTION GUARANTEE FOR THE EXECUTION OF A CONTRACT IN TERMS OF JBCC 2000 (6.2 EDITION MAY 2018)

1. With reference to the contract between _____

_____ (hereinafter referred to as the “**contractor**”) and the Government of the Republic of South Africa in its EZEMVELO KZN WILDLIFE (hereinafter referred to as the “**employer**”), Contract/Tender No: EKZWN18/2022/23 , for the New 2 x 6 Bed Staff Accommodation units at Mpila Camp Imfolozi Game Reserve (hereinafter referred to as the “contract”) in the amount of R _____, (_____), (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 _____, (_____) 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 pecunia; 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 pay 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 27.0 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 paid 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 ceases.

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: _____

VARIABLE CONSTRUCTION GUARANTEE - JBCC 2000 PRINCIPAL BUILDING AGREEMENT (Edition 6.2 of May 2018)

VARIABLE CONSTRUCTION GUARANTEE FOR THE EXECUTION OF A CONTRACT IN TERMS OF JBCC 2000 (6.2 EDITION MAY 2016)

1. With reference to the contract between _____

_____ (hereinafter referred to as the “**contractor**”) and the Government of the Republic of South Africa, in its EZEMVELO KZN WILDLIFE, (hereinafter referred to as the “**employer**”), Contract/Tender No: **EKZNW18/2022/23**, for **New 2 x 6 Bed Staff Accommodation units at Mpila Camp Imfolozi Game Reserve** (hereinafter referred to as the “**contract**” in the amount of R _____, (_____) (hereinafter referred 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 _____, (_____) being 10% of the **contract sum** (excluding VAT), for the due fulfilment of the contract.

2. 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.

3. The **guarantor** hereby renounces the benefits of the exceptions *non numeratae pecunia; 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 pay 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 27.0 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 paid 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)

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 C2: PRICING DATA

C2.1 PRICING INSTRUCTIONS

PRICING INSTRUCTIONS - JBCC 2000 PRINCIPAL BUILDING AGREEMENT (Edition 6.2 of May 2018)

BID NUMBER: EKZNW18/2022/23

NEW 2 X 6 BED STAFF ACCOMMODATION UNITS AT
MPILA CAMP IMFOLOZI GAME RESERVE

1. GENERAL

- (a) Bidders are to study the Bills of Quantities, general and project-specific specifications, drawings, and all other information issued with this Bid Document to acquaint themselves fully with the scope of works required, as well as the timelines and project limitations that will need to be included in their planning of and therefore pricing of the works.
- (b) Further to the above, Bidders are urged to visit the site to determine site-specific limitations, requirements etc. that will affect the works and that may or may not be explicitly stated within this Bid Document. All site conditions, except those that are latent will be deemed to have been taken cognisance of in the pricing data.

2. PRICING INSTRUCTIONS AND NOTES

(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.

(d) WORKING AT HEIGHTS - SCAFFOLDING

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

(e) VIEW SITE

Before submitting his Bid the contractor shall visit the site and satisfy himself as to the nature and extent of the work to be done and the value of the materials contained in the buildings or portions of the buildings to be demolished and/or altered. No claim for any variations of the contract sum in respect of the nature and extent of the work or of inferior or damaged materials will be entertained.

(f) SPECIFICATIONS

Bidders are referred to the Standard Preambles, SP1-SP74, the Supplementary Preambles SUP1-SUP5), all Architectural and Engineering specifications, the geotechnical report, OHS and HIV specifications, the drawings, the site information and scope of works documents, and to all general and project-specific specifications as referenced in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

(g) SUPPLEMENTARY PREAMBLES

The notes and instructions above are not exhaustive, and the attention of the Bidder is drawn in particular to the supplementary preambles at the beginning of each trade in the Bills of Quantities for further information, restrictions, requirements, etc.

(h) PROVISIONAL SUMS

Where the work required in respect of provisional sums can be based on rates included in the Bills of Quantities, these rates will be used and no profit and attendance will be allowed on same.

**NEW 2 X 6 BED STAFF ACCOMMODATION UNITS
AT MPILA CAMP IMFOLOZI GAME RESERVE**



**PART C3:
BILL OF QUANTITIES**

**NEW 2 X 6 BED STAFF ACCOMMODATION UNITS
AT MPILA CAMP IMFOLOZI GAME RESERVE**



**PART C3.1:
PRELIMINARIES**

SECTION 1

PRELIMINARIES

MEANING OF TERMS “TENDER / TENDERER”

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

PRELIMINARIES

The JBCC Preliminaries **Edition 6.2, May 2018** for use with the JBCC Principal Building Agreement Edition 6.2, May 2018 is taken to be incorporated herein. The tenderer is deemed to have referred to these documents for the full intent and meaning of each clause. These clauses are referred to by number and heading only. Where standard clauses or options are not applicable to the contract such modifications or corrections as are necessary are given under each relevant clause. Where an item is not relevant to this specific contract such item is marked “N/A” signifying “Not Applicable”

PRICING OF PRELIMINARIES

Should Option A, as set out in clause B10.3.1 hereinafter be used for the adjustment of preliminaries then each item priced is to be allocated to one or more of the three categories Fixed, Value Related or Time Related and the respective amounts entered in the spaces provided under each item

The following section A, read in conjunction with “The Contract Data”, represent the changes made to the Contract. The contractors attention is therefore drawn to same, as no claims whatsoever will be entertained in respect of changes made to the Contract. Further, should any discrepancy be found between this document (Preliminaries) and The Contract Data, then this document shall take precedence.

Tenderers are to include all costs for the preliminaries and general costs related to the electrical subcontractor within the pricing of these preliminaries. No further claims in this regard will be entertained.

Items not priced in these Preliminaries shall be deemed to be provided free from any charge to the Employer

SECTION A: JBCC PRINCIPAL BUILDING AGREEMENT

DEFINITIONS

A1.0 DEFINITIONS AND INTERPRETATION

Clause 1.1 Definition of “**Commencement Date**” is added:

“**COMMENCEMENT DATE**” means the date that the contractor acquires possession of the site, i.e. site handover, which will only occur after the **agreement**, made in terms of the Form of Offer and Acceptance, comes into effect

Clause 1.1 Definition of “**Guarantee for Construction**” is amended by replacing it with the following:

Carried to Collection R

“**GUARANTEE FOR CONSTRUCTION**” means a guarantee at call obtained by the **contractor** from an institution approved by the **employer** in terms of the **employer’s** construction guarantee form as approved by the employer.

Clause 1.1 Definition of “**Construction Period**” is amended by replacing it with the following:

“**CONSTRUCTION PERIOD**” means the period commencing on the **site handover date** and ending on the date of **practical completion**

Clause 1.1 Definition of “**Corrupt Practice**” is added:

“**CORRUPT PRACTICE**” means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution.

Clause 1.1 Definition of “**Fraudulent Practice**” is added:

“**FRAUDULENT PRACTICE**” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of any tenderer and includes collusive practice among tenderers (prior to or after the tender submission) designed to establish tender prices at artificial non-competitive levels and to deprive the tenderer of the benefits of free and open competition

Clause 1.1 Definition of “**Interest**” is amended by replacing it with the following:

“**INTEREST**” means the interest rates applicable on this contract, whether specifically indicated in the relevant clauses or not, will be the rate as determined by the Minister of Finance, from time to time, in terms of section 80(1)(b) of the Public Finance Management Act, 1999 (Act No. 1 of 1999)

Clause 1.1 Definition of “**Principal Agent**” is amended by replacing it with the following:

“**PRINCIPAL AGENT**” means the person or entity appointed by the **employer** and named in the **schedule** as such. In the event of a **principal agent** not being appointed, then all the duties and obligations of a **principal agent** as detailed in the **agreement** shall be fulfilled by a representative of the **employer** as named in the **schedule**

Clause 1.1 Definition of “**Security**” is amended by replacing it with the following:

“**SECURITY**” means the form of security provided by the **employer** or **contractor**, as stated in the **schedule**, from which the **contractor** or **employer** may recover expense or loss

Clause 1 is amended by the addition of the following:

Clause 1.2.6 If any provision of this **agreement**, which is not material to its efficacy as a whole, is rendered void, illegal or unenforceable in any respect under the law; the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired thereby and the parties shall endeavour in good faith to agree an alternative provision to the void, illegal or unenforceable provision.

Carried to Collection R

Clause 1.2.7 No waiver or relaxation of any of the provisions or terms of this **agreement** (or any **agreement** or other document issued or executed pursuant to in terms of this **agreement**) shall operate as an estoppels against a party in respect of any of its rights in terms if this **agreement**

No failure by a party to enforce any provision of this **agreement** shall constitute a waiver of such provisions or affect in any way such party's right to require the performance of such provision at any time in the future, nor shall a waiver of a subsequent breach nullify the effectiveness of the provision itself.

Clause 1.2.8 If the contractor constitutes a joint venture, consortium or other unincorporated grouping of two or more persons:-

Clause 1.2.8.1 these persons are deemed to be to be jointly and severally liable to the **employer** for the performance of this **agreement**

Clause 1.2.8.2 these persons shall notify the **employer** of their leader who has authority to bind the **contractor** and each of these persons: and

Clause 1.2.8.3 the **contractor** shall not alter its composition or legal status without the prior written consent of the **employer**

Clause 1.2.9 The **contract documents** shall be taken to be mutually explanatory of one another but in the event of ambiguity, discrepancy, divergence or inconsistency in or between them, the JBCC Principal Building Agreement as the special conditions shall prevail over all other **contract documents**.

Fixed: _____ Value related: _____ Time related: _____

Item

A2.0 LAW, REGULATIONS AND NOTICES

Clause 2.0

Note: A separate clause has been included in Section C: Specific Preliminaries of the **bills of quantities** 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 and baseline risk assesment.

Clause 2.4.2 is amended by replacing it with the following

No clause

Clause 2.0 is amended by the addition of the following:-

Clause 2.5 The contractor shall take all reasonable precautions to maintain the health and safety of persons in and about the execution of the **works**. Without limitation the contractor hereby:

Clause 2.5.1 accepts that the **employer** will appoint him as the **Principal Contractor** (as defined and provided for under the Construction Regulations 2014 (as amended) and promulgated under the Occupational Health and Safety Act 85 of 1993 (as amended) for the site

Carried to Collection R

Clause 2.5.2 acknowledges and confirms that the **contract sum** includes a sufficient amount for proper compliance with the **employer's** health and safety specification, the construction regulations, all applicable health and safety laws and regulations and the health and safety rules, guidelines and procedures provided for in this **agreement** and generally for the proper maintenance of health and safety in and about the execution of the works including all materials, labour, training, equipment and all other requirements necessary to ensure proper and complete health and safety implementation and management on site in accordance with applicable legislation; and

Clause 2.5.3 undertakes, in and about the execution of the **works**, to comply with the Construction Regulations and with all applicable health and safety laws and regulations and rules and guidelines and procedures otherwise provided for under the **agreement** and shall ensure that all **sub-contractors**, employees and others under the **contractor's** direction and control, likewise observe and comply with the foregoing.

Clause 2.6 The **employer** reserves the right to pay direct (i.e) not through the **contractor** for all or any permanent connections to local or other authority services, for which provisional amounts have been included within the **contract documents**. In the event of the **employer** paying direct for these charges, the **contractor** will not be entitled to a ten per cent (10%) mark-up in terms of clause 32.4. All such provisional amounts included in the **contract sum** will, as a result, be omitted

Fixed: _____ Value related: _____ Time related: _____
Item

A3.0 OFFER AND ACCEPTANCE

Clause 3.0

Clause 3.2 is amended by replacing it with the following

Clause 3.2 The currency applicable to this agreement is South African Rands.

Fixed: _____ Value related: _____ Time related: _____
Item

A4.0 CESSION AND ASSIGNMENT

Clause 4.0

Fixed: _____ Value related: _____ Time related: _____
Item

A5.0 DOCUMENTS

Clause 5.0

Clause 5.0 is amended by the addition of the following:

Carried to Collection R

Clause 5.7 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

Fixed:_____ Value related:_____ Time related:_____

Item

A6.0 EMPLOYER'S AGENTS

Clause 6.0

Clause 6.1. is amended to include clauses 26.8, 26.12 and 26.13 in terms of which the **employer** has retained its authority and has not given a mandate to the **Principal Agent** and in terms of which the **employer** shall sign all documents.

Fixed:_____ Value related:_____ Time related:_____

Item

A7.0 DESIGN RESPONSIBILITY

Clause 7.0 : DESIGN RESPONSIBILITY

Clause 7.1 is amended by the addition of the following:

Notwithstanding the provisions of clause 7.2, where the **contractor** undertakes the design responsibility of any aspect of the **works**, he shall indemnify and hold free the **employer** and his **agents** from responsibility for any claim or proceeding whatsoever due to any fault including fault in the design detailing and calculations. In respect of the design responsibility undertaken by any **nominated** or **selected sub-contractor**, such **sub-contractor** shall similarly, indemnify and hold free the **employer**, his **agents** and the **contractor** from responsibility for any claim or proceeding whatsoever due to any fault including fault in the design, detailing and calculations except where such **sub-contractor** is from the **mandatory partner** in which case the liability shall vest in the **contractor**.

Clause 7.0 is amended by the addition of the following:-

Clause 7.4 Without limiting or derogating from the employers rights under sub-clause 7.2, the contractor shall;

Clause 7.4.1 ensure that every **n/s or selected sub-contractor**, simultaneously with the signing of the relevant **n/s agreement**, signs (in terms of a written signing authority acceptable to the **principal agent**) and delivers to the **employer** a design, materials and workmanship warranty and undertaking (design warranty) in favour of the **employer**.

Clause 7.4.2 provide the **employer** evidence of suitable and sufficient professional indemnity insurance for all **sub-contractors** whose **subcontract** involves design work other than for temporary works.

Carried to Collection R

Clause 7.5 pending delivery of the design warranty and the required evidence of the professional indemnity insurance **contractor** shall, notwithstanding anything to the contrary in the **agreement** and without limiting or derogating from the **employer's** rights under sub-clause 7.2, be responsible for issues that may arise, and pertaining to the relevant **sub-contract works**.

Fixed: _____ Value related: _____ Time related: _____

Item

INSURANCE AND SECURITIES

A8.0 **WORKS RISK**

Clause 8.0

Clause 8.5.1 is amended to read as follows:

The use or occupation, after **practical completion**, of any part of the **works** by the **employer**, the **employer's** servants or **agents**; and those for whose acts or omissions they are responsible.

Fixed: _____ Value related: _____ Time related: _____

Item

A9.0 **INDEMNITIES**

Clause 9.0

Fixed: _____ Value related: _____ Time related: _____

Item

A10.0 **INSURANCES**

Clause 10.0 is amended by the addition of the following:-

10.11.1 Damage to the Works

(a) Without in any way limiting the **contractor's** obligations in terms of the contract, the **contractor** shall bear the full risk of damage to and/or destruction of the **works** by whatever cause during construction of the **works** and hereby indemnifies and holds harmless the **employer** against any such damage. The **contractor** shall take such precautions and security measures and other steps for the protection and security of the **works** as the **contractor** may deem necessary

(b) The **contractor** shall at all times proceed immediately to remove or dispose of any debris arising from damage to or destruction of the **works** and to rebuild, restore, replace and/or repair the **works**

(c) The **employer** shall carry the risk of damage to or destruction of the **works** and materials paid for by the **employer** that is the result of the excepted risks as set out in 10.6

(d) Where the **employer** bears the risk in terms of this contract, the **contractor** shall, if requested to do so, reinstate any damage or destroyed portions of the **works** and the costs of such reinstatement shall be measured and valued in terms of 32.0 hereof

Carried to Collection R

10.12 Injury to Persons or loss of or damage to Properties

- (a) The **contractor** shall be liable for and hereby indemnifies the **employer** against any liability, loss, claim or proceeding whether arising in common law or by statute, consequent upon personal injuries to or the death of any person whomsoever arising out of or in the course of or caused by the execution of the **works** unless due to any act or negligence of any person for whose actions the **employer** is legally liable
- (b) The **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
- (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**
- (d) The **contractor** shall be responsible for the protection and safety of such portions of the premises placed under his control by the **employer** for the purpose of executing the **works** until the issue of the **certificate of practical completion**
- (e) Where the execution of the **works** involves the risk of removal of or interference with support to adjoining properties including land or structures or any structures to be altered or added to, the **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
- (f) The **contractor** shall at all times proceed immediately at his own cost to remove or dispose of any debris and to rebuild, restore, replace and/or repair such property and to execute the **works**

10.13 High risk insurance

In the event of the project being executed in a geological area classified as a "High Risk Area", that is an area which is subject to highly unstable subsurface conditions that might result in catastrophic ground movement evident by sinkhole or doline formation the following will apply:

Carried to Collection R

10.13.1 Damage to the works

The **contractor** shall, from the **commencement date** of the **works** until the date of the **certificate of practical completion** bear the full risk of and hereby indemnifies and holds harmless the **employer** against any damage to and/or destruction of the **works** consequent upon a catastrophic ground movement as mentioned above. The **contractor** shall take such precautions and security measures and other steps for the protection of the **works** as he may deem necessary

When so instructed to do so by the **principal agent**, the **contractor** shall proceed immediately to remove and/or dispose of any debris arising from damage to or destruction of the **works** and to rebuild, restore, replace and/or repair the **works**, at the **contractor's** own costs

10.13.2 Injury to persons or loss of or damage to property

The **contractor** shall be liable for and hereby indemnifies and holds harmless the **employer** against any liability, loss, claim or proceeding arising at any time during the period of the contract whether arising in common law or by statute, consequent upon personal injuries to or the death of any person whomsoever resulting from, arising out of, or caused by a catastrophic ground movement as mentioned above

The **contractor** shall be liable for and hereby indemnifies the **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

10.13.3 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

10.13.4 The **employer** shall be entitled to recover any and all losses and/or damages of whatever nature suffered or incurred consequent upon the **contractor's** default of his obligations as set out in 10.7.1; 10.7.2 and 10.7.3. Such losses or damages may be recovered from the **contractor** or by deducting the same from any amounts still due under this contract or under any other contract presently or hereafter existing between the **employer** and the **contractor** and for this purpose all these contracts shall be considered one indivisible whole

Fixed:_____ Value related:_____ Time related:_____

Item

A11.0 **SECURITY**

Clause 11.0 is amended by deleting clauses 11.1 - 11.8 and replacing them with the following:

Carried to Collection R

11.1.1 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

11.1.1.2 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

11.1.1.3 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

11.1.1.4 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

11.1.1.5 The employer shall be entitled to recover expense and loss from the cash deposit in terms of 27.0 provided that the employer complies with the provisions of 27.3.1 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

11.1.1.6 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

11.1.1.7 Where security as a variable construction guarantee of ten percent (10%) of the contract sum (excluding VAT) has been selected:

11.1.1.7.a 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

11.1.1.7.b The variable construction guarantee shall reduce and expire in terms of the Variable Construction Guarantee form included in the invitation to tender

11.1.1.7.c The employer shall return the variable construction guarantee to the contractor within fourteen (14) calendar days of it expiring

11.1.1.7.d Where the employer has a right of recovery against the contractor in terms of 27.0, the employer shall issue a written demand in terms of the fixed or variable construction guarantee

11.1.1.8 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:

11.1.1.8.a 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)

11.1.1.8.b 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

11.1.1.8.c The employer shall return the fixed construction guarantee to the contractor within fourteen (14) calendar days of it expiring

Carried to Collection R

11.1.1.9 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

Clause 11.11 In the event that the value of the works (excluding adjustments in terms of the contract price adjustment provisions) increases during the course of the contract by an amount of ten per cent (10%) or more of the contract sum, then upon written request from the principal agent, the contractor shall, within ten (10) working days of such request arrange to have the construction guarantee guaranteed sum increased accordingly. The approved cost of increasing the construction guarantee shall be added to the contract sum. If the contractor is so required to increase the guaranteed sum, no further amounts shall be certified or paid to the contractor until the guarantee has been increased.

Should the **contractor** be a joint venture, then each entity shall be jointly and severably liable to the **employer** for all obligations and liabilities in terms of this **agreement** The amount so claimed against and paid under the **construction guarantee** shall be reimbursed to the **contractor** if and when the **construction guarantee** is reinstated, extended or substituted in compliance with the above (as the case may be) and the **principal agent** shall forthwith issue a **payment certificate** certifying the amount so due to the **contractor**.

Fixed:_____ Value related:_____ Time related:_____

Item

EXECUTION

A12.0 **OBLIGATION OF THE PARTIES**

Clause 12.0

Clause 12.1.5 is amended by replacing it with the following clause:

Give the **contractor** possession of the **site** within ten (10) **working days** of the **contractor** complying with the terms of 12.2.22

Clause 12.2.3 is deleted in its entirety and replaced with the following clause:

The security selected in terms of 11.0, as amended

Clause 12.2 is amended by the addition of the following clause:

12.2.22 An acceptable health and safety plan, required in terms of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), within thirty (30) **calendar days** of **commencement date**

Carried to Collection R

Clause 12.0 is amended by the addition of the following:

12.4 Programme

12.4.1 This programme shall include 1½ **working days** per working month for inclement weather which shall include but not be limited to, wind and rain delays. Such provisions shall be monitored by the **contractor** and agreed with the **principal agent** as and when such inclement weather takes place and shall be recorded in the **programme** based on actual stoppages when incurred

12.4.2 Notwithstanding the fact that the **programme** has been prepared in conjunction with the **principal agent**, the **contractor** shall be responsible at all times for maintaining the accuracy, validity and reasonableness of the **programme**, and the implementation thereof.

12.4.3 The **programme** shall be compiled based on the critical path method of programming and the critical activities are to be clearly highlighted. It shall be compiled in such a way that logic is not constrained by resource limitations unless specifically agreed otherwise by the **principal agent**.

The **programme** will be processed on the **principal agent's** system and the **contractor** shall provide all the co-operation necessary to achieve this.

12.4.4 Documentation will not be available in complete detail at the commencement stage. However the **contractor**, in conjunction with the **principal agent**, shall plan the works on provisional information, to an agreed level of detail relating to the level of detailed information available and with sufficient scope to include future detail without disrupting the basic logic as initially agreed.

For programming purposes, it shall be assumed that the quantities contained in the **bills of quantities** are provisional and thus shall be utilized as a guide only for the drawing up of the **programme**.

Where assumptions are made in regard to programming aspects, such assumptions shall be agreed by the **contractor** and the **principal agent**, and suitably recorded in the **programme**.

12.4.5 Should circumstances change to the extent where the **contractor** is of the opinion that changes to the **programme** are required, then the **contractor** shall submit a written request to the **principal agent** for such changes, clearly identifying the reasons for requiring such change. The **contractor** and **principal agent** shall thereafter agree such changes, if any, and any costs related thereto as per the principles espoused in 15.5.1 above.

Should the **principal agent** be of the opinion that the **programme** requires revisions, and notwithstanding the fact that a request for such revision has not been received from the **contractor**, the **principal agent** shall be entitled to instruct the **contractor** to revise the **programme** accordingly, unless the **contractor** can submit reasonable justification for not doing so.

Any acceleration and/or special measures sanctioned by the **principal agent** together with associated effects shall be incorporated in a revision to the programme.

Carried to Collection R

12.4.6 The **contractor** and the **principal agent** shall, at regular intervals not exceeding 14 (fourteen) **calendar days**, agree the state of progress of the **works** relative to the latest agreed revision of the **programme**. Such **agreement** shall include the recording of actual commencement and **completion** dates for each activity and shall constitute the official record of the progress at such point in time.

12.4.7 In addition to and based on the **programme** systems and format dictated above, the **contractor** shall devise detailed working **programmes**. These shall be drawn on a regular basis (at least monthly), to the satisfaction of the **principal agent**.

Such working **programmes** shall at all times relate to the constraints of the current **programme**.

12.4.8 **Contract instructions** shall be issued in accordance with clause 17, as amended.

Fixed: _____ Value related: _____ Time related: _____

Item

A13.0 SETTING OUT OF THE WORKS

The following sub-clauses are hereby added to this clause:-

13.3 The **contractor** shall provide general attendance and all reasonable assistance to the employer's appointed land surveyor, or any other land surveyor who may be appointed by the **employer**.

13.4 The **contractor** shall perform tolerance control checks regularly throughout the **construction period** and report on these at regular intervals to the **principal agent** in a format approved by the **principal agent**. Should the **contractor** fail to comply with this requirement to the satisfaction of the **principal agent**, progressively as the structure is constructed, the **employer** shall be entitled to commission a registered land surveyor to do so on the **contractor's** behalf and at the **contractor's** expense

Fixed: _____ Value related: _____ Time related: _____

Item

A14.0 NOMINATED SUBCONTRACTORS

Clause 14.0

Clause 14.1.5 is amended by replacing it with the following:

No clause

Note: See item B9.1 and B9.2 hereinafter for adjustment of attendance on **nominated subcontractors** executing work allowed for under provisional sums. Notwithstanding anything to the contrary contained in the **agreement**, the contractor shall be aware that profit and attendance shall only be certified once in respect of each provisional sum.

Fixed: _____ Value related: _____ Time related: _____

Item

Carried to Collection R

A15.0 **SELECTED SUBCONTRACTORS**

Clause 15.0

The **contractor** cannot exclude the sub-contract **tendered works** from his responsibility, after the **selected sub-contractor** has been accepted, subject to the **tendered** conditions being met.

Clause 15.1.5 is deleted and replaced by the following :-

Advance payment on **selected sub-contracts**, will not be effected.

Clause 15.0 is amended by the addition of the following:

Clause 15.9 The **contractor** will provide specific provisions regarding the use of all plant, equipment and services allowed for the various **sub-contractors**, to ensure comprehensive pricing by such **sub-contractors**. The relevant amendments to the **sub-contract tender** documents are to be clearly identified by the **contractor** and included in the **sub-contract tender** documentation and **agreements** to be signed with each of the **sub-contractor** and as such, the **contractor** shall be fully responsible for the management and cost of such **sub-contracts**.

A16.0 **EMPLOYER'S DIRECT CONTRACTORS**

Clause 16.0

Fixed: _____ Value related: _____ Time related: _____

Item

A17.0 **CONTRACT INSTRUCTIONS**

Clause 17.0

Clause 17.1 is amended by the addition of the following:

Clause 17.1.21 Changes to the sequence and timing of the works.

Clause 17.1.22 Acceleration (irrespective of whether or not the **principal agent** rules that the **contractor** is entitled to a revision of the date for **practical completion**, but provided that a **contract instruction** to accelerate may not, unless at a time when it would not be reasonable for an experienced **contractor** to achieve the required acceleration given the available remaining period).

Fixed: _____ Value related: _____ Time related: _____

Item

Carried to Collection R

COMPLETIONA18.0 **INTERIM COMPLETION**

Clause 18.0

Fixed: _____ Value related: _____ Time related: _____

Item

A19.0 **PRACTICAL COMPLETION**

Clause 19.1 shall be amended by the addition of the following clause:

19.1.3 In order to achieve **practical completion** of the **works** and without derogating from the generality of the term **practical completion**, the **contractor** shall, as a minimum comply with the following basic criteria. These criteria should not be regarded as comprehensive but as an expansion of the term **practical completion**.

19.1.3.1 In regard to the **completion** date applicable to the **works**, the following shall apply:

(i) Access to all Areas

At the date of **practical completion** all areas, external access areas and the like must be fully complete with unobstructed access in every respect. This includes the roadways from perimeter of site to the basement, driveway access through basements and including the following:

- a) All emergency fire, traffic and signage.
- b) Road markings.
- c) Permanent lighting and power to all roadways, basement driveways, guardhouses and driveway gates.
- d) All fire escape routes and staircases complete and free of any obstructions.

ii) External Facades

At the date of practical completion, the external facade including balconies must be fully complete in every respect including the following:

- a) All facade surfaces must be painted, polished or cleaned where required and must be free of any builder's debris, marks or scratches
- b) Fully operational and commissioned permanent power and lighting
- c) All doors and gates complete with all ironmongery and lock sets with keys for handover
- d) Screed and tiling to falls tested and corrected as necessary prior to hand over
- e) Roofs completed and waterproofed.
- f) All finishes to be de-snagged and complete to ensure that scaffolding is removed from sidewalks

Carried to Collection R

iii) Security

a) All areas to be handed over must be secure, doors fitted and lockable, windows glazed and all security and access control systems to be operative. All shop fronts and windows must be lockable with ironmongery fitted and keys marked and tagged for handover. After practical completion no person shall be allowed to access the facilities without prior consent by the occupants or management.

iv) Electrical

a) Electrical installation is to be completed and fully commissioned - permanent power and lighting inclusive of all telephone and data installations.

v) Plumbing installation

a) Plumbing installation it to be complete, commissioned / permanent water supply and drainage tested. Pipe work to be pressured tested.

vi) External sewer, drainage and storm water connection

a) All sewer, drainage and storm-water systems must have been completed and inspected and signed off.

vii) Floors, ceilings, kitchen cabinets, appliances, Cupboards, joinery, shop fitting, shower and general finishes

a) Completed and finished in accordance with Architect's layouts, interiors specifications and schedules. All appliances and equipment to be installed, connected, commissioned and tested.

Carried to Collection R

viii) General

a) All certificates required to obtain an Occupancy Certificate from the Municipality Building Inspectorate in accordance with the National Building Regulations to be provided.

b) Approved building plans from the Municipality to be provided.

ix) Structural/Civil Works

Clause 19 is amended by the addition of the following:

19.8 Without derogating from the generality of the requirements of **practical completion** the following specific requirements shall apply:-

19.8.1 All items on the **practical completion** list must be completed and attended to in their entirety.

19.8.2 All defects noted on the quality control sheets issued by the **principal agent** during the currency of the **contract** are to have been completed and attended to in their entirety.

19.8.3 The following certificates of compliance shall be required (excluding others that may be required by the local/national authority) from the **contractor** to achieve **practical completion**:

a) A certificate from the contractor that all aspects of the construction regulations of 2014 have been complied with.

b) A certificate from the contractor that the National Building Regulations have been complied with.

c) IOPSA (Institute of Plumbing South Africa) Certificate/s of compliance with respect to plumbing and drainage.

d) Electrical certificates of compliance.

e) Lightning protection certificates of compliance

f) Certificate/s of compliance and fire certificate/s from the **contractor** and fire chief respectively.

g) Certificate/s of compliance in respect of termite proofing

h) Waterproofing guarantee/s

i) Certificate/s of compliance with respect to all glazing.

j) Soil poisoning certificate/s

k) Soil compaction certificate/s

l) TR1 and TR2 certificates in respect of timber roof construction

m) Certificate/s of compliance in respect to galvanising of structural steelwork

n) Glazing certificate/s

Note: The above list is not exhaustive and the contractor will be required to provide all further certificates/guarantees as requested by the **principal agent**

19.8.4 A complete set of maintenance and operating manuals together with all workmanship and material warranties and guarantees are to be compiled and issued to the **principal agent** prior to achievement of **practical completion**.

Carried to Collection R

19.8.5 All relevant test results i.e. concrete test cube, compaction, density etc. are to be produced in hard copy, in a file, clearly referenced with a covering summary sheet. These results to be from an independent geotechnical testing laboratory and not from the concrete suppliers batching plant

19.8.6 Complete Method Statements and motivations for any works that the Contractor proposes conducting that do not directly and completely align with the requirements as set out in the Contract documentation.

19.8.7 A quality control file for all civil and structural engineering works done by the Contractors QC/QA team and signed off by the Engineer at each stage during the project should include :

- Pre and post concrete and reinforcing inspections
- Pressure testing pipe results signed off by a registered plumber and
- Inspection sheets of Engineers
- All tests, namely, Mod, CBR, Indicator, DCP and Density tests

Fixed: _____ Value related: _____ Time related: _____

Item

A20.0 COMPLETION IN SECTIONS - NA

Clause 20.0

Fixed: _____ Value related: _____ Time related: _____

Item

A21.0 DEFECTS LIABILITY PERIOD AND FINAL COMPLETION

Clause 21.0

Clause 21.0 is amended by the addition of the following:

Clause 21.13 The **contractor** shall attend to defects during the **defects liability** period on a progressive basis, to the satisfaction of the **principal agent**, and will not be permitted to wait until the end of the **defects liability** period or until the amount of **defects** accumulates in order to attend to a comprehensive list of **defects**.

Fixed: _____ Value related: _____ Time related: _____

Item

Carried to Collection R

A22.0 **LATENT DEFECTS LIABILITY PERIOD**

Clause 22.0

Clause 22.0 is amended by the addition of the following:

22.4 The **contractor** shall make good all defects that appear up to the date of **final completion** and shall make good all latent defects that become patent and are notified to the **contractor** prior to the expiry of the latent **defects liability** period.

Clause 22.5 Any water leakage into the building, either in the roof, external wall or other element of building susceptible to water leakage shall unless proved to be a design defect, damaged caused by the **employer** or **employer's end user**, damage arising from theft of vandalism or inadequate maintenance not in accordance with the submitted and accepted guidelines, be deemed a latent defect.

Fixed: _____ Value related: _____ Time related: _____

Item

A23.0 **REVISION OF DATE FOR PRACTICAL COMPLETION**

Clause 23.0

Clause 23.1.1 is amended by the addition of the following:

Clause 23.0 is amended by the addition of the following:-

Clause 23.9 No revision to the date for **practical completion** shall be considered unless the **contractor** demonstrates, to the reasonable satisfaction of the **principal agent** and on the basis of the current **programme** or other **programme** acceptable to the **principal agent** for this purpose, that the delay is on the critical path to **practical completion** of the **works**.

Clause 23.10 The removal and replacement of materials and/or workmanship that do not conform to specification or drawings shall not constitute grounds for a revision of the date for **practical completion** nor for any adjustment of the **contract value**.

Clause 23.11 If the **contractor** is instructed to accelerate, the **contractor** shall promptly take necessary steps to ensure that the **works** are completed timeously, including the provision by him of additional resources, plant, manpower, etc. and the working overtime or additional overtime beyond that contemplated at the time of **tender** (at all times adhering to the regulations and requirements of all authorities) and by all other adequate and proper means and methods. The **contractor** shall prove that such steps are being taken if called upon to do so.

Carried to Collection R

Clause 23.0 is amended by the addition of the following:-

Clause 23.9 No revision to the date for **practical completion** shall be considered unless the **contractor** demonstrates, to the reasonable satisfaction of the **principal agent** and on the basis of the current **programme** or other **programme** acceptable to the **principal agent** for this purpose, that the delay is on the critical path to **practical completion** of the **works**.

Clause 23.10 The removal and replacement of materials and/or workmanship that do not conform to specification or drawings shall not constitute grounds for a revision of the date for **practical completion** nor for any adjustment of the **contract value**.

Clause 23.11 If the **contractor** is instructed to accelerate, the **contractor** shall promptly take necessary steps to ensure that the **works** are completed timeously, including the provision by him of additional resources, plant, manpower, etc. and the working overtime or additional overtime beyond that contemplated at the time of **tender** (at all times adhering to the regulations and requirements of all authorities) and by all other adequate and proper means and methods. The **contractor** shall prove that such steps are being taken if called upon to do so.

Clause 23.12 Notwithstanding anything to the contrary the **contractor** shall not be entitled to a revision of the date for **practical completion** for delays arising from municipal, Eskom or other interruption in energy supply to the **site**.

Fixed: _____ Value related: _____ Time related: _____

Item

A24.0 **PENALTY FOR LATE AND NON-COMPLETION**

Clause 24.0

Fixed: _____ Value related: _____ Time related: _____

Item

A25.0 **PAYMENT**

Clause 25.0

Clause 25.3.3 is amended by replacing "11.1.2;11.4.1" with "11.0 as amended"

Clause 25.5 replaced with the following:-

"Where stored off the **site**, covered by an advance payment guarantee issued by a registered bank approved by the **principal agent** and submitted with the **contractor's** progress claim. Failure to include the advance **payment guarantee** with the contractor's progress claim will result in the value of the **materials and goods** being omitted from the amount certified for payment.

Fixed: _____ Value related: _____ Time related: _____

Item

Carried to Collection R

A26.0 **ADJUSTMENT TO THE CONTRACT VALUE AND FINAL ACCOUNT**

Clause 26.0

Clause 26.6 is amended by the addition of the following at the end of the sentence:-

26.6 - The **contractor** shall within forty (40) **working days** of the delay ceasing, submit details of the expense and loss to the **principal agent** failing which the **contractor** shall forfeit such claim.

Clause 26.0 is amended by the addition of the following:-

Clause 26.14 Where prices are submitted by the **contractor** or **n/s subcontractor** during the progress of the works in respect of **contract instructions** or in regard to a claim under the terms of the **agreement** or in respect to provisional sums or budgetary allowances and notwithstanding the fact that such prices may be used in an interim **payment certificate**, there shall be no presumption of acceptance. Should the **principal agent** wish to accept any such prices prior to the issue of the final **payment certificate**, such acceptance shall be in writing.

Clause 26.15 The **contractor** shall not receive any mark-up for overheads and profit on any omission of tenant installation work or tenant installation work by **direct contractors** and others, except where pricing is allowed for in the Bills of Quantities. Claims for loss of profit shall not be entertained.

Fixed:_____ Value related:_____ Time related:_____

Item

A27.0 **RECOVERY OF EXPENSE AND LOSS**

Clause 27.0

Clause 27.0 is amended by deleting clauses 27.3 - 27.4 and replacing them with the following:

27.3.1 Where the employer decides to recover an amount due in terms of 27.3 from a payment reduction applied in terms of 11.1.1.5, the employer shall notify the contractor and the principal agent thereof. Should such amount not be paid to the employer within seven (7) calendar days of the date of receipt of such a notice by the contractor, the employer may recover such an amount from the security.

27.3.2 Where the employer decides to recover an amount due in terms in terms of 27.3 from a construction guarantee or advance payment guarantee held as security, the employer shall issue a written demand to the contractor in terms of such guarantees.

Carried to Collection R

27.4 Where a provisional sequestration or provisional liquidation order has been granted or where an order has been granted which commences sequestration, liquidation, bankruptcy, receivership, winding-up or any similar effect against the contractor or this agreement is cancelled in terms of 29.0, the employer may issue a demand to the guarantor in terms of the construction guarantee or advance payment guarantee held as security.

Fixed:_____ Value related:_____ Time related:_____

Item

SUSPENSION AND TERMINATION

A28.0 SUSPENSION BY THE CONTRACTOR

Clause 28.0

Fixed:_____ Value related:_____ Time related:_____

Item

A29.0 TERMINATION

Clause 29.0

Clause 29.1 is amended by the addition of the following clauses:

29.1.4 refuses or neglects to comply strictly with any of the conditions of contract

29.1.5 estate being sequestered, liquidated or surrendered in terms of the insolvency laws in force within the Republic of South Africa

29.1.6 in the judgement of the **employer**, has engaged in **corrupt** or **fraudulent practices** in competing for or in executing the contract

Clause 29.3 is amended by adding :

“The **employer** (through instruction to the **principal agent**) may furthermore terminate this **agreement** by giving written notice of termination where:-

(i) the **contractor** becomes bankrupt or insolvent (commercially or otherwise),

(ii) an application is made, or a resolution is adopted, for the winding-up of the **contractor** (whether provisional or final)

(iii) business rescue proceedings have commenced in respect of the contractor in accordance with the Companies Act, 71 of 2008 (as amended) ("the Companies Act"), or

Carried to Collection R

(iv) the **contractor** proposes or effects an offer of compromise with the **contractor's** creditors in accordance with section 155 of the Companies Act or begins negotiations or takes any other step with a view to generally deferring, re-scheduling or otherwise re-adjusting all or a material part of the **contractor's** indebtedness or proposes or makes a general scheme, arrangement or composition with or for the benefit of the **contractor's** creditors or a moratorium is proposed or agreed in respect of or affecting all or a material part of the **contractor's** indebtedness.

Note: In the case of a Joint Venture or Consortium, the **employer** shall have the right to proceed with cancellation in terms of Clause 36 (as amended) where a minimum of one (1) party to the Joint Venture or Consortium is in default.

Clause 29.0 is amended by the addition of the following clause:

29.29 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

Clause 29.25.4 is amended by replacing "sixty (60)" with "one hundred and twenty (120)"

Clause 29.0 is amended by the addition of the following sub-clauses:

Clause 29.30 "Where the **employer** does not receive the requisite local authority approvals (to the **employer's** satisfaction) for the construction of the permanent works at the **site**".

29.31 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

29.32 Notwithstanding any clause to the contrary, on cancellation of this **agreement** either by the **employer** or the **contractor**; or for any reason whatsoever, the **contractor** shall on written instruction, discontinue with the **works** on a date stated and withdraw himself from the **site**. The **contractor** shall not be entitled to refuse to withdraw from the **works** on the grounds of any lien or right of retention or on the grounds of any other right whatsoever

Fixed: _____ Value related: _____ Time related: _____
Item

Carried to Collection R

DISPUTE RESOLUTION

A30.0 **DISPUTE RESOLUTION**

Clause 30.0

Clause 30.3 - Replace "ten (10)" with "fifteen (15)"

Fixed: _____ Value related: _____ Time related: _____

Item

Carried to Collection R

SECTION B: JBCC PRELIMINARIES

B1.0	DEFINITIONS AND INTERPRETATION
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</p> <p style="text-align: right;">Item</p>
B2.0	DOCUMENTS
B2.1	<p><i>Checking of documents</i></p> <p>The tenderer shall check the numbers of the pages of the tender documents and should any be missing or duplicated, or the reproduction is indistinct, or if any doubt exists as to the intent or meaning of any description, or where the contract documents contain any obvious errors, the tenderer shall notify the principal agent forthwith thereof and the principal agent shall promptly give a written directive.</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>Where the construction documentation for the works is not complete and will only be completed during the construction period the contractor and principal agent shall work together to identify the requirements for the provision of construction documentation. The contractor and principal agent shall agree the dates that are reasonable by when the contractor is to be provided with each outstanding item of the anticipated construction documentation.</p> <p>The contractor and n/s subcontractor shall agree dates by when the n/s subcontractor is to be provided with each outstanding item of the anticipated construction documentation.</p> <p>The budgetary allowances for selected sub-contract amounts allocated for subsequent trades included in this document will be separately procured, based on multiple procurement of selected sub-contractors during the construction period.</p> <p>Fixed:_____ Value related:_____ Time related:_____</p> <p style="text-align: right;">Item</p>
B2.4	<p><i>Ordering of materials and goods</i></p> <p>Fixed:_____ Value related:_____ Time related:_____</p> <p style="text-align: right;">Item</p>
Carried to Collection R	

B3.0	PREVIOUS WORK AND ADJOINING PROPERTIES
B3.1	<p><i>Previous work – dimensional accuracy</i></p> <p>In consecutive contracts the contractor shall, within a reasonable period after taking possession of the site, but not exceeding ten (10) per cent of the construction period or twenty (20) working days whichever is the lesser, check the existing levels, lines, profiles and the like affecting the works and satisfy himself as to the dimensional accuracy of work previously executed. The contractor shall forthwith notify the principal agent and request a contract instruction regarding any dimensional inaccuracy found in work previously executed.</p> <p>Fixed:_____ Value related:_____ Time related:_____</p> <p style="text-align: right;">Item</p>
B3.2	<p><i>Previous work – defects - N/A</i></p> <p>Fixed:_____ Value related:_____ Time related:_____</p>
B3.3	<p><i>Inspection of Adjoining Properties</i></p> <p>Fixed:_____ Value related:_____ Time related:_____</p> <p style="text-align: right;">Item</p>
B4.0	THE SITE
B4.2	<p><i>Enclosure of the works</i></p> <p>Fixed:_____ Value related:_____ Time related:_____</p>
B4.3	<p><i>Geotechnical investigation and other investigations</i></p> <p>Fixed:_____ Value related:_____ Time related:_____</p> <p style="text-align: right;">Item</p>
B4.4	<p><i>Encroachments</i></p> <p>Fixed:_____ Value related:_____ Time related:_____</p> <p style="text-align: right;">Item</p>
B4.5	<p><i>Existing premises occupied</i></p> <p>Fixed:_____ Value related:_____ Time related:_____</p> <p style="text-align: right;">Item</p>
B4.6	<p><i>Services – known</i></p> <p>Fixed:_____ Value related:_____ Time related:_____</p> <p style="text-align: right;">Item</p>
Carried to Collection R	

B5.0 **MANAGEMENT OF CONTRACT**

B5.1 **Management of the works**

Fixed: _____ Value related: _____ Time related: _____
Item

B5.2 **Progress meetings**

Fixed: _____ Value related: _____ Time related: _____
Item

B5.3 **Technical meetings**

Fixed: _____ Value related: _____ Time related: _____
Item

B6.0 **SAMPLES, SHOP DRAWINGS AND MANUFACTURERS' INSTRUCTIONS**

B6.1 **Samples of materials**

Fixed: _____ Value related: _____ Time related: _____
Item

B6.2 **Workmanship samples**

Fixed: _____ Value related: _____ Time related: _____
Item

B6.3 **Shop drawings**

Clause 6.3 is amended by the addition of the following:

Clause 6.3.3 - General responsibilities - The **contractor** shall provide a person or persons

- a) To familiarise himself with all drawings produced for construction purposes. This will
- b) To provide comprehensive lists of shop drawings to be prepared by relevant **sub-**
- c) To check all shop drawings for sufficiency prior to submission. It is expected that such checking will include all co-ordination and pro-active resolution of any conflicting services and elements. It is also noted that resolution of co-ordination problems will require attendance at services and element co-ordination meetings called by the **principal agent** and when necessary.

Clause 6.3.4 - Procedures - The **contractor** shall, at his own expense, prepare and submit

The **contractor** shall present a complete schedule showing the sequence of submission of shop drawings, including submission dates, for all trades and the scheduled dates for approval of all drawings. This schedule shall take into account a two weeks check period from the date of the receipt of all shop drawings and/or catalogue data.

All submissions shall be on dates as indicated in the above **schedule** and sufficiently in advance to permit the **contractor** to meet fabrication deadlines; no claim for extensions to the construction period will be granted to the contractor by reason of his failure in this respect.

Carried to collection

The **contractor** shall submit four copies of catalogues and data for approval. The **contractor** shall check all submissions for conformity with the contract drawings and specifications and correct any errors, omissions or deviations before submission.

All submissions shall bear the **contractor's** dated stamp of approval as evidence that they have been so checked and corrected by the contractor. Any drawings, schedule or catalogue submitted without this stamp will not be considered and will be returned unapproved.

When the **principal agent** advises the **contractor** that shop drawings have been approved, he shall immediately submit to the **principal agent** the original transparencies of such drawings so that the **principal agent's** stamp of approval may be appended thereto. Thereafter the **contractor** shall furnish to the **principal agent** four prints of the approved shop drawings, setting out drawings and schedules. The **contractor** shall also furnish as many prints of the approved shop drawings and schedules as may be required for use on the site. No work shall be performed from any shop drawings and/or catalogues not stamped with the **principal agent's** approval.

The **contractor** shall be responsible for ensuring that all dimensions conform to the dimensions of built work.

If the submissions differ from the requirements of the contract, the contractor shall make specific mention of each difference in his letter of transmission with a request for substitution, together with his reasons for same, in order that, if acceptable, suitable action may be taken by the principal agent. Otherwise the executing of the work shall be in strict accordance with the requirements of the contract.

Corrections of shop drawings by the **principal agent** shall not change the scope of work. Should any such correction be considered to constitute a change of scope of work, the contractor shall notify the principal agent in writing within not more than seven (7) calendar days of such change and shall not proceed with the fabrication until so authorised by the principal agent. Claims for change of scope made after performance of the work constituting the claimed change of scope will not be considered.

Unless otherwise agreed with the **principal agent**, shop drawings shall be prepared to show all details of installation, including reticulation, fixing, etc. of all components and assemblies, or if the contractor desires to deviate from the design these drawings shall be all to accordance with the above procedures and at the contractors expense.

Fixed: _____ Value related: _____ Time related: _____

Item

B6.4 **Compliance with manufacturers' instructions**

Fixed: _____ Value related: _____ Time related: _____

Item

B7.0 **DEPOSITS AND FEES**

B7.1 **Deposits and fees**

The **contractor** shall pay all deposits, fees and charges according to law, regulation or by **law** of any local or other authorities that relate to hoardings, the use of pavements, street encroachment or crossing, permission for the suspension of parking facilities and the like.

Carried to collection

Fixed: _____ Value related: _____ Time related: _____

Item

B8.0 **TEMPORARY SERVICES**

B8.1 **Water**

Clause 8.1 is amplified by the addition of the following:

Water for construction purposes must be obtained from alternative water source/s (i.e. any supply other than water that is produced and distributed by a regulated water service authority from a licensed water treatment works for human consumption) - e.g. dams, rivers, boreholes, springs, rainwater harvesting, recycled sewage water, etc. The alternative water resource shall not be of an inferior quality standard than that required for construction purposes. The Contractor shall provide relevant certificates from an approved authority demonstrating the suitability of the water for construction purposes at his own expense, prior to usage for the works. Should this not be done, any consequential instructions to rectify or in any way occasioned as a result of the usage of non-approved water, shall be solely for the contractors account.

Fixed: _____ Value related: _____ Time related: _____

Item

B8.2 **Electricity**

Tenderers are referred to schedule of variables hereinafter.

Fixed: _____ Value related: _____ Time related: _____

Item

B8.3 **Ablution and welfare facilities**

Clause 8.3 is amended by deleting it in its entirety and replacing with the following:

Ablution facilities shall be provided by the contractor as stated in the **schedule** and shall be provided for the use of all persons on the **site**. The **contractor** shall maintain such facilities in a thoroughly clean and tidy condition and make good damage thereto at his own expense.

Fixed: _____ Value related: _____ Time related: _____

Item

B8.3 **Ablution and welfare facilities**

Clause 8.3 is amended by deleting it in its entirety and replacing with the following:

Ablution facilities shall be provided by the contractor as stated in the **schedule** and shall be provided for the use of all persons on the **site**. The **contractor** shall maintain such facilities in a thoroughly clean and tidy condition and make good damage thereto at his own expense.

Fixed: _____ Value related: _____ Time related: _____

Item

Carried to Collection R

B8.4	<p>Communication facilities</p>
	<p>Clause 8.4 is amended by deleting it in its entirety and replacing with the following:</p>
	<p>The contractor shall provide communication facilities as required for his staff as well as for the agents of the employer when on site and shall be liable for all costs related thereto.</p>
	<p>Fixed:_____ Value related:_____ Time related:_____</p> <p style="text-align: right;">Item</p>
B9.0	<p>PRIME COST AMOUNTS</p>
B9.1	<p>Responsibility for prime cost amounts</p>
	<p>Fixed:_____ Value related:_____ Time related:_____</p> <p style="text-align: right;">Item</p>
B10.0	<p>ATTENDANCE ON N/S SUBCONTRACTORS</p>
B10.1	<p>General attendance</p>
	<p>Fixed:_____ Value related:_____ Time related:_____</p> <p style="text-align: right;">Item</p>
B10.2	<p>Special attendance</p>
	<p>Clause 10.2 is amended by deleting it in its entirety and replacing with the following:</p>
	<p>The contractor shall make provision in his rates for special attendance on each n/s sub-contractor. Special attendance such as unloading, storing, placing in position, providing special power supplies, specific hoisting, craneage and scaffolding requirements, provision of temporary casing and/or other specific protection of the works, special security and clearing away rubbish are to be determined by the tenderer and shall be deemed to be included in rates for attendance.</p>
	<p>Fixed:_____ Value related:_____ Time related:_____</p> <p style="text-align: right;">Item</p>
B11.0	<p>GENERAL</p>
B11.1	<p>Protection of the works</p>
	<p>Fixed:_____ Value related:_____ Time related:_____</p> <p style="text-align: right;">Item</p>
B11.2	<p>Protection / isolation of existing / sectionally occupied works</p>
	<p>Fixed:_____ Value related:_____ Time related:_____</p> <p style="text-align: right;">Item</p>
B11.3	<p>Security of the works</p>
	<p>The contractor shall take all appropriate measure for general security of the works.</p>
	<p>Fixed:_____ Value related:_____ Time related:_____</p> <p style="text-align: right;">Item</p>
<p>Carried to Collection R</p>	

B11.4 **Notice before covering work**

Fixed: _____ Value related: _____ Time related: _____
Item

B11.5 **Disturbance**

The **contractor** shall execute the **works** with a minimum of disturbance to adjoining premises, any part of the **works** already handed over and the occupants of those premises and/or parts. Any specific requirements are stated in the **schedule**.

Fixed: _____ Value related: _____ Time related: _____
Item

B11.6 **Environmental disturbance**

The **contractor** shall execute the **works** without any unreasonable adverse effect on the environment. Any specific requirements are stated in the **schedule**.

Fixed: _____ Value related: _____ Time related: _____
Item

B11.7 **Works cleaning and clearing**

Fixed: _____ Value related: _____ Time related: _____
Item

B11.8 **Vermin**

Fixed: _____ Value related: _____ Time related: _____
Item

B11.9 **Overhand work**

Fixed: _____ Value related: _____ Time related: _____
Item

B11.10 **Tenant installations**

Fixed: _____ Value related: _____ Time related: _____
Item

B11.11 **Advertising**

Fixed: _____ Value related: _____ Time related: _____
Item

Carried to Collection R

SECTION C: SPECIFIC PRELIMINARIES

Section C contains specific preliminary items which apply to this contract except where N/A (Not Applicable) appears against an item

C1.0 **CONTRACT DRAWINGS**

Note: Where drawings are described in these Bills of Quantities as having been "appended elsewhere in this Bid Document", bidders are directed to the USB drive issued with the Bid Document for all drawings, as no hard copies will be issued during the Bid period.

The drawings issued with the tender documents do not comprise the complete set but serve as a guide only for tendering purposes and for indicating the scope of the work to enable the tenderer to acquaint himself with the nature and extent of the **works** and the manner in which they are to be executed

Should any part of the drawings not be clearly understood by the tenderer he shall, before submitting his tender, obtain clarification in writing from the **principal agent**

Fixed: _____ Value related: _____ Time related: _____ **Item**

C2.0 **GENERAL PREAMBLES**

The complete suite of project specific specifications are appended at the back of these Bills of Quantities, and shall be read in conjunction with the **bills of quantities** and be referred to for the full descriptions of work to be done and materials to be used. These specifications shall take precedence in any discrepancy between themselves and the general specifications and/or between themselves and the Bills of Quantities. Should any document referenced in the Bills of Quantities not be present in a Bid Document, the Bidder is to notify the Departmental Project Manager immediately. Rates for work will be deemed to be inclusive of all requirements as per the project specific and general specifications

Fixed: _____ Value related: _____ Time related: _____ **Item**

C3.0 **TRADE NAMES**

Wherever a trade name for any product has been described in the **bills of quantities** the tenderer's attention is drawn to the fact that any other product of equal quality may be used subject to the written approval of the **principal agent** being obtained prior to the closing date for submission of tenders

If prior written approval for an alternative product is not obtained, the product described shall be deemed to have been tendered for

Fixed: _____ Value related: _____ Time related: _____ **Item**

Carried to Collection R

C4.0 **IMPORTED MATERIALS AND EQUIPMENT**

Where imported items are listed in the tender documents, the tenderer shall provide all the information called for, failing which the price of any such item, materials or equipment shall be excluded from currency fluctuations. (refer to Schedule of Imported Materials and Equipment to be completed by tenderer).

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.

Fixed: _____ Value related: _____ Time related: _____
Item

C5.0 **VIEWING THE SITE IN SECURITY AREAS -N/A**

Fixed: _____ Value related: _____ Time related: _____
Item

C6.0 **COMMENCEMENT OF WORKS IN SECURITY AREAS - N/A**

Fixed: _____ Value related: _____ Time related: _____
Item

C7.0 **ENTRANCE PERMITS TO SECURITY AREAS - N/A**

Fixed: _____ Value related: _____ Time related: _____
Item

C8.0 **SECURITY CHECK OF PERSONNEL**

The **principal agent** may require the **contractor** to have his personnel and workmen, or a certain number of them, security classified

In the event of the **principal agent** requesting the removal of a person or persons from the **works** for security reasons, the **contractor** shall do so forthwith and shall thereafter ensure that such person or persons are denied access to the **works** and the **site** and/or to any document or information relating to the **works**

Fixed: _____ Value related: _____ Time related: _____
Item

Carried to Collection R

C9.0 **UNAUTHORISED PERSONS ON SITE**

The **contractor** shall at all times strictly exclude all unauthorized persons from the **works**.

No workmen are to be allowed under any circumstances to sleep or deposit any personal effects on the **site**. The contractor must provide any necessary independent shelters or sheds required for any workmen off site.

Furthermore, the **contractor** shall take all measures necessary to ensure that no unauthorised workmen are allowed onto the **site** at any time without the specific permission of the **principal agent**.

Fixed: _____ Value related: _____ Time related: _____
Item

C10.0 **CONTRACTOR ACCESS**

The **contractor** shall provide for a security access card for all personnel (management and labour) entering the **site**. Each identification tag is to include for the following information: -

- i. Project name
- ii. Colour photo (ID book size)
- iii. Company name
- iv. Name and ID number

Fixed: _____ Value related: _____ Time related: _____
Item

C11.0 **STOCKPILE**

The stockpile of fill material on the site is to be maintained and used in the required backfill behind retaining walls, as indicated by the **engineers**, and unless otherwise directed.

Fixed: _____ Value related: _____ Time related: _____
Item

C12.0 **SITE ESTABLISHMENT**

The contractor may erect/hire/purchase an establishment on or contiguous to the site to include offices, stores, lay down areas etc. for his own, and **sub-contractor's** use subject to the foregoing provisions of Clause B3.1 of these Preliminaries. Such establishment is to be pre-planned and is subject to the approval of the **principal agent**.

Notwithstanding the **principal agent's** approval, the **contractor** shall be responsible for any costs relating to relocation of any site establishment required to allow access for the timeous execution of the **works**.

Fixed: _____ Value related: _____ Time related: _____
Item

Carried to Collection R

C13.0 **PRICING OF BILLS OF QUANTITIES**

Tenderers are to allow opposite each item for all costs in connection therewith. All prices to include, unless otherwise stated, for all materials, fabrication, conveyance and delivery, unloading, storing, unpacking, hoisting, labour, setting, fitting and fixing in position, cutting and waste (except where to be measured in accordance with the Standard System of Measurement) patterns, models and templates, plant, temporary works, returning of packing, duties, taxes, imports, establishment charges, overheads, profit, attendance (general and specific) and all other obligations arising out of the agreement.

The rate inserted by the tenderer opposite each item will be deemed to be applicable to the item as originally specified. Should the tenderer wish to offer an alternative specification to any particular item, he is to provide this as an alternative to his Bid sum for consideration by the principal agent as a submission with his Bid. No alternatives will be accepted during the construction period unless prior approval at tender stage is granted in writing by the Principal Agent. Under no circumstances are the descriptions in the bills of quantities to be altered by the tenderer.

Where a bill of quantities item includes "or other approved" within its description and the tenderer has priced a "or other approved" specification, the tenderer is to provide a schedule of all such bill items that have been priced as "or other approved" including the full details and specifications of the "or other approved" items priced. Should no schedule of "or other approved" items be received with the 'formal tender submission' from the tenderer it shall be deemed that the tenderer has priced the item as per the original specification in the tender documents and no alternative specifications will be accepted for the tendered rate.

Items left unpriced will be deemed to be covered in prices against other items throughout these bills of quantities and no claim for any extras arising out of the tenderer's omission to price any item will be entertained.

Prices for all plant, temporary works, services and other items provided shall include for the supply, maintenance, operating cost and subsequent removal and making good as necessary.

The contractor shall execute work during "overtime" hours as necessary in order to complete the project within the agreed construction period and shall provide such resources and work such overtime hours as necessary. Costs for the execution of this work under these conditions shall be included within the contract sum. (See requirements in terms of Clause B12.1.23 of these Preliminaries)

Fixed: _____ Value related: _____ Time related: _____

Item

C14.0 **NATURE OF PROJECT IN RELATION TO PRICING**

Tenderers are advised that the nature of this contract is such that the detail design will evolve in parallel with construction and the appointment of **selected / nominated sub-contractors** have not been concluded. Notwithstanding this, the rates and prices in the **bills of quantities** in the **tender** submission shall remain in full force and effect.

Fixed: _____ Value related: _____ Time related: _____

Item

Carried to Collection R

C15.0 **COSTS OF CLAIMS**

All costs incurred by the contractor in the preparation of claims to the satisfaction of the principal agent and/or quantity surveyor shall be borne by the contractor.

In furtherance of the above, the Contractor shall ensure that at least one dedicated, full-time, senior resource is allocated for the preparation of cost related information including but not limited to payment claims, cost reports, contractor cash flows, etc. Pricing will be deemed to be inclusive of this requirement

Fixed: _____ Value related: _____ Time related: _____

Item

C16.0 **SATISFACTION OF CONTRACTOR AS TO SCOPE OF INSURANCES**

Submission of a **tender** shall be deemed as acceptance by the **contractor** that he is satisfied with the scope of the insurances effected by the **employer**, supplemented by any additional insurances considered necessary by himself.

The **employer** warrants that the insurances effected by him shall remain in force for the duration stipulated in the **agreement**.

Any clarification of the scope of cover provided by the policies arranged by the **employer** should be obtained from the **employer's** representative.

The **contractor** warrants that he shall give all notices and shall observe all the terms and conditions and requirements of all insurances applicable to this contract.

Where the **contractor** is responsible for the appointment of **nominated or selected sub-contractors** then the **contractor** shall :

1. Ensure that potential and appointed **sub-contractors** are aware of the whole content of clauses A8, A9, A10, A11 and A12.

2. Ensure the compliance of **sub-contractors** with these clauses where applicable. In the event of any occurrence which is likely to give rise to a claim under the insurances arranged by the employer, the contractor/sub-contractor shall:

3. In addition to any statutory requirement or other requirements contained in the **agreement**, immediately notify the **employer's** insurance Brokers by telephone or telefax giving the circumstances, nature and an estimate of the loss or damage or liability;

4. Complete a claims advice form, in conjunction with both the **principal agent** and the **employer** and return to the Insurance Brokers without delay;

5. Assist as required, in negotiations of the settlement of claims with the insurers through the **employer's** Insurance Brokers.

The **employer** shall have the right to make all and any enquiry on the site or elsewhere as to the cause and results of any such occurrence and the **contractor** shall give the **employer** and his insurers full facilities for carrying out such enquiries.

Fixed: _____ Value related: _____ Time related: _____

Item

Carried to Collection R

C17.0 **PROHIBITION ON TAKING OF PHOTOGRAPHS**

In terms of article 119 of the Defence Act, 44 of 1957, it is prohibited to sketch or to take photographs of any military site or installation or any building or civil works thereon or to be in possession of a camera or other apparatus used for taking of photographs except when authorized thereto by or on behalf of the Minister

The same prohibition is also applicable to all correctional institutions in terms of article 44.1(e) of the Correctional Services Act 8 of 1959

Fixed:_____ Value related:_____ Time related:_____

Item

C18.0 **HIV/AIDS AWARENESS**

It is required of the **contractor** to thoroughly study the HIV/AIDS Specification (PW 1544) of the Department that must be read together with and is deemed to be incorporated under this Section of the **bills of quantities**. Provision for pricing of HIV/AIDS awareness is made under items C18.1 to C18.5 hereafter and it is explicitly pointed out that all requirements of the aforementioned specification are deemed to be priced hereunder, as the said items represent the only method of measurement and no additional items or extras to the contract in this regard shall be entertained

The **contractor** must take note that compliance with the HIV/AIDS Specification is compulsory. In the event of partial or total non-compliance, the **principal agent**, notwithstanding the provisions of clause A 31.0 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

Fixed:_____ Value related:_____ Time related:_____

Item

C18.1 **AWARENESS CHAMPION**

Selection, appointment, briefing and making available of an Awareness Champion including provision of all relevant services, all in accordance with the HIV/AIDS Specification

Fixed:_____ Value related:_____ Time related:_____

Item

C18.2 **AWARENESS WORKSHOPS**

Selection and appointment of a competent Service Provider approved by the **principal agent**, provision of a Service Provider Workshop Plan and a suitable venue, conducting of awareness workshops by means of traditional and/or modern multi-media techniques, including follow-up courses, making available all tuition material and performing assessment procedures, all in accordance with the HIV/AIDS Specification

Fixed:_____ Value related:_____ Time related:_____

Item

Carried to Collection R

C18.3	<p>POSTERS, BOOKLETS, VIDEOS, ETC.</p> <p>Provision, displaying, maintaining and replacing when necessary of plastic laminated posters, booklets and educational videos, etc. for the duration of the construction period, all in accordance with the HIV/AIDS Specification</p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>
C18.4	<p>ACCESS TO CONDOMS</p> <p>Provision and maintenance of condom dispensers fixed in position, including male and female condoms, replenishing male and female condoms on a daily basis as required for the duration of the construction period, all in accordance with the HIV/AIDS Specification</p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>
C18.5	<p>MONITORING</p> <p>Monitoring HIV/AIDS awareness of workers, providing the principal agent with access to information including making available all reports, thoroughly completed and reflecting the correct information, for the duration of the construction period and close out, all in accordance with the HIV/AIDS Specification</p> <p>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>
C19.0	<p>OCCUPATIONAL HEALTH AND SAFETY ACT</p> <p>The contractor shall comply with all the requirements set out in the Construction Regulations, 2003 issued under the Occupational Health and Safety Act, 1993 (Act No 85 of 1993)</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.</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>Fixed: _____ Value related: _____ Time related: _____</p> <p style="text-align: right;">Item</p>
Carried to Collection R	

C19.1 COVID SAFETY AND COMPLIANCE

The contractor is to price against this item for all requirements in respect of COVID prevention, management and compliance. In this regard, the following items must as a minimum be considered when pricing and will be deemed to be included in the rate entered against this item:

a. COVID marshalls for the due enforcement of COVID policy. The required number of marshalls in order to effectively enforce COVID protocol is to be determined by the contractor in accordance with his programme of works. Marshalls are to be duly and effectively trained in the execution of their duties. In addition, marshalls must be provided with the relevant PPE and tools i.e. temperature readers, sanitiser etc. to carry out their designated function.

b. COVID related PPE - the contractor is to ensure that an ample supply of COVID specific PPE is available to the site at all times. This shall include relevant disposable masks, sanitiser, gloves (if applicable), etc. These items shall be sufficient for the contractors own staff, sub-contractors and their staff, as well as the professional team and all visitors to the site.

c. Sanitising of surfaces - a major infection risk remains the contamination of surfaces. With this in mind, the contractor will be required to sanitise all touch surfaces daily i.e. door and window handles, tools, plant controls, desks and other works surfaces, ablutions, kitchens and associated surfaces, etc.

d. COVID testing - the contractor will be required to ensure that all employees (own and subcontractor) are tested for COVID prior to the commencement of work on site.

e. Signage - the contractor shall provide and maintain COVID signage around the site and work areas.

f. Isolation areas - the contractor shall provide and maintain isolation areas for suspected COVID cases amongst the workforce.

g. Waste disposal - COVID related PPE is to be properly disposed of in demarcated areas and the contractor shall accordingly provide same facilities including marked bins, regular waste removal, etc.

h. Transportation of employees - where employees are transported to site by the contractor, he shall ensure that transport arrangements support social distancing and COVID safety.

i. Programme effects - the contractor shall consider the effect of COVID compliance and regulations i.e. social distancing on his programme and shall ensure that costs related to this are included in this item.

j. COVID Management - As part of OHS, the contractor shall ensure that COVID management and reporting are regular and accurate and that preventative or reactive measures are taken as required in order to ensure safety of all personnel on site.

The above mentioned items represent the minimum expected requirements in respect of COVID management and compliance. Tenderers shall in addition price any and all other anticipated costs against this item as no further claims in this regard will be entertained.

Fixed: _____ Value related: _____ Time related: _____

Item

Carried to Collection R

C22.0 **MATERIALS REQUIRED BY AMAFA - N/A**

Fixed:_____ Value Related:_____ Time Related:_____

ItemC23.0 **TRAFFIC AND MUNICIPAL REQUIREMENTS**

It will be required of the Contractor to obtain the necessary local authority permissions and clearances, and to make the necessary arrangements including the employment of specialist service providers and/or personnel in for traffic diversion, road closures etc. as required for timeous delivery of materials, etc. to site. The Bidder is to price for all necessary requirements under this item .

In addition, the Contractor shall be responsible for the effective management of traffic into and out of the site for the duration of the contract and that order is generally maintained through the adequate deployment of resources including traffic cones, danger tape, temporary traffic barriers and consultation with a traffic specialist all to the approval of the principal agent

Fixed:_____ Value Related:_____ Time Related:_____

ItemC24 **COMMUNITY LIAISON OFFICER (CLO).**

UTILISATION OF A COMMUNITY LIAISON OFFICER.

1. The Contractor shall allow for 2 x General Labour (GL) rate at the time of tender and all costs necessary for the engagement of the services of a Community Liaison Officer (CLO) for the full duration of this contract.

2. A CLO will be identified by the local structures (Project Steering Committee) of the ward areas and appointed following fair and transparent interviewing process, to be conducted in the presence of local structures and the contractor representative, in order to assist the Contractor in the procurement of any local labour, etc. required for this project. The Contractor is to liaise with the CLO and afford him any assistance needed in ensuring sound working relations with the local community.

Fixed:_____ Value Related:_____ Time Related:_____

Item**Key Responsibilities of the CLO are envisaged to include and not necessary be limited to:**

1. Assisting local leadership in conducting skills and resources audit which facilitates sourcing labour from within the ward or targeted areas for employment, as required by contractor
2. Assisting in sourcing labour-only domestic sub-contractors and the procurement of materials from local resources, as required by the contractor.
3. Assisting the contractor by identifying areas of potential conflict and or threats to the project or to stakeholders in the project and recommend appropriate action to the contractor.
4. Assisting contractor and stakeholders in the project in the resolution of any conflict which may arise.
5. Establishing and ensuring that sufficient and open communication channels between the contractor and the work force are maintained.

Carried to Collection R

6. Establish and ensuring that efficient and open communication channels between the contractor and the community are maintained.

7. Identifying and reporting to the Contractor regarding issues where communication between stakeholder is necessary, recommend courses of action and facilitate such communications.

8. Assisting the Contractor and the work force in the establishment of grievance procedures and necessary recommendation to the Contractor regarding the grievances and solution thereto.

9. Attending to site meetings and project implementation meetings as required by the Contractor and prepare and submit periodic reports as may be required by the Contractor from time to time.

10. Attending to such other duties which are consistent with the functions of a CLO, as may be required by the Contractor from time to time.

Tenderers are to price twice the rate of unskilled local labour rate for the Community Liaison Officer (CLO) ,all costs arising out of compliance with the foregoing and in the event of a Tenderer failing to price against this item or making inadequate financial provision against this item for compliance as aforesaid, then no claim for costs or additional cost incurred will be entertained by the Head: Formal Housing.

Fixed:_____ Value Related:_____ Time Related:_____

Item

C26.0 Domestic Sub-Contractors

Notwithstanding the relevant conditions of contract and amendments thereto in respect of domestic sub-contractors, it is a specific condition of this contract that should the contractor at any time subsequent to award of the contract elect to change or replace any specialist domestic sub-contractor in his employ, reasons for the change or replacement shall be furnished by the contractor to the principal agent, who shall, after performing a risk assessment of the proposed new specialist sub-contractor, reserve the right to reject the appointment of a new sub-contractor based on either the reasons put forward by the main contractor for removal of the previous sub-contractor, or due perceived risk as per the aforementioned risk assessment. The contractor shall be obliged to abide by the decision of the principal agent in this regard.

Fixed:_____ Value Related:_____ Time Related:_____

Item

C27.0 Specialist Sub-Contractors

Tenderers are to price for all preliminaries related items in respect of the specialist electrical, electronics, mechanical etc. works to be carried out on this project. No further claims for same will be entertained.

Fixed:_____ Value Related:_____ Time Related:_____

Item

Carried to Collection R

PRELIMINARIES COLLECTION

	Page	R	c
	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
	11		
	12		
	13		
	14		
	15		
	16		
	17		
	18		
	19		
	20		
	21		
	22		
	23		
	24		
	25		
	26		
	27		
	28		
	29		
	30		
	31		
	32		
	33		
	Carried forward		

	R	c
Brought forward		
34		
35		
36		
37		
38		
39		
40		
SECTION 1 PRELIMINARIES		
CARRIED TO FINAL SUMMARY	R	
SUBTOTALS:		
Category: Fixed R		
Category: Value R		
Category: Time R		

**NEW 2 X 6 BED STAFF ACCOMMODATION UNITS
AT MPILA CAMP IMFOLOZI GAME RESERVE**



**PART C3.2:
BUILDING WORKS**

Unit Quantity Rate Amount

BILL NO. 1
EARTHWORKS

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

SUPPLEMENTARY PREAMBLES

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

Nature of ground

A soil investigation has NOT been carried out on site.

The nature of the ground is assumed to be loose sandy material, therefore 'earth', but possibly interspersed with 'soft rock' or 'hard rock'.

Carried to Collection

R

	Unit	Quantity	Rate	Amount
<p>The tenderer should acquaint himself with the nature of the material to be excavated.</p> <p><u>Carting away of excavated material</u></p> <p>Descriptions of carting away of excavated material shall be deemed to include loading excavated material onto trucks directly from the excavations or, alternatively, from stock piles situated on the building site, and dumping at registered dumpsites.</p> <p><u>Bulking</u></p> <p>No allowance has been made for bulking, contractor to allow accordingly. No claims in this regard will be entertained and bidders are therefore to allow accordingly for same in their rates.</p> <p><u>Filling</u></p> <p>Notwithstanding the reference to prescribed multiple handling in clause 1 page 6 of the Standard System of Measuring Building Work, prices for filling and backfilling shall include for all selection and any necessary multiple handling of material that may be required in respect of the founding requirements.</p> <p><u>Testing</u></p> <p>Prices for filling are to include for all necessary density tests in accordance with the relevant sections of SANS.</p> <p><u>Proximity to existing structures</u></p> <p>Bidders are to note that some of the following measured work is to be undertaken in close proximity to existing buildings. No claims in this regard will be entertained.</p> <p><u>EXCAVATION ETC</u></p> <p><u>Excavation in earth not exceeding 2m deep</u></p>				
1				
	m ³	148		
A		74		
B		74		
2				
	m ³	76		
A		38		
B		38		
<u>Extra over trench and hole etc, excavations in earth for excavation in</u>				
3				
	m ³	22		
A		11		
B		11		
4				
	m ³	12		
A		6		
B		6		
5				
	m ³	22		
A		11		
B		11		
Carried to Collection				
			R	
Bill No. 1				
Earthworks				

		Unit	Quantity	Rate	Amount
6	Class A boulders containing more than 40% by volume of boulders of size exceeding 0,03m ³ and not exceeding 20m ³ A 6 B 6 <u>Risk of collapse of excavations</u>	m ³	12		
7	Sides of trench and hole excavations not exceeding 1,5m deep A 262 B 262 <u>Extra over all excavations for carting away</u>	m ²	524		
8	Surplus material from excavations and/or stock piles on site to a dumping site to be located by the contractor A 112 B 112 <u>Keeping excavations free of water</u>	m ³	224		
9	Keeping excavations free of water Item 1 <u>Selected granular filling of crushed graded stone (G5) supplied by the contractor, compacted to 95% Mod AASHTO density</u>	Item			
10	Under floors, steps, pavings, etc. A 32 B 32 <u>Compaction of surfaces, including scarifying for a depth of 150mm, breaking down oversize material where necessary and compacting to 95% Mod AASHTO density</u>	m ³	64		
11	Ground surface under floors, etc. A 246 B 246 <u>Prescribed density tests on filling</u>	m ²	492		
12	Modified AASHTO Density test A 10 B 10 <u>SOIL POISONING</u> <u>Approved brand of anti-termite soil poison applied by a Registered Pest Control company and guaranteed against termite infestation for ten years :</u>	No	20		
13	Under floors, etc. including forming and poisoning shallow furrows against foundation walls etc., filling in furrows and ramming A 246 B 246	m ²	492		
14	To bottoms and sides of trenches etc. A 473 B 473	m ²	946		
	Carried to Collection			R	
	Bill No. 1 Earthworks				

Amount

BILL NO. 1
EARTHWORKS
COLLECTION

Page No

Brought Forward from Page

1

2

3

Carried to Summary

R

Unit Quantity Rate Amount

BILL NO. 2
CONCRETE, FORMWORK AND REINFORCEMENT

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

SUPPLEMENTARY PREAMBLES

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

Concrete cast against excavated surfaces

Unless otherwise stated, all concrete in bases, footings, etc. Shall be cast against excavated surfaces.

Carried to Collection

R

Bill No. 2
 Concrete, Formwork And Reinforcement

Unit Quantity Rate Amount

Cost of tests

The costs of making, storing and testing of concrete test cubes as required under the relevant SANS shall include the cost of providing cube moulds necessary for the purpose, for testing costs and for submitting reports on the tests to the principal agent. The testing shall be undertaken by an independent firm or institution nominated by the contractor to the approval of the principal agent. (Test cubes are measured separately).

Concrete:

Rates for concrete shall be deemed to include for all necessary transportation, hoisting, etc. to render a perfect, sound and stable installation all to the satisfaction of the Structural Engineer.

Bidders are to note that delay claims related to the supply of concrete decking, reinforcement etc. will not be entertained and are thus urged to take cognisance of quantities required and secure supply accordingly.

Formwork

Descriptions of formwork shall be deemed to include use and waste only (except where described as 'left in' or 'permanent'), for fitting together in the required forms, wedging, plumbing and fixing to true angles and surfaces as necessary to ensure easy release during stripping and for reconditioning as necessary before re-use.

The vertical strutting shall be carried down to such construction as is sufficiently strong to afford the required support without damage and shall remain in position until the newly constructed work is able to support itself.

Formwork to soffits of solid slabs etc. shall be deemed to be to slabs not exceeding 250mm thick unless otherwise described.

Formwork to sides of bases, pile caps, ground beams, etc. will only be measured where it is prescribed by the engineer for design reasons. Formwork necessitated by irregularity or collapse of excavated faces will not be measured and the cost thereof shall be deemed to be included in the allowance for taking the risk of collapse of the sides of the excavations, provision for which is made in Earthworks.

The Contractor is to furnish the Principal Agent with the Structural Stability certificate to be obtained from the Engineer.

All formwork to remain in position and only removed on approval of the Engineer.

Carried to Collection

R

		Unit	Quantity	Rate	Amount
<p>Formwork to sides of bases, pile caps, ground beams, etc. will only be measured where it is prescribed by the engineer for design reasons. Formwork necessitated by irregularity or collapse of excavated faces will not be measured and the cost thereof shall be deemed to be included in the allowance for taking the risk of collapse of the sides of the excavations, provision for which is made in Earthworks</p>					
<p><u>UNREINFORCED CONCRETE CAST AGAINST EXCAVATED SURFACES</u></p>					
<p><u>15Mpa/19mm concrete</u></p>					
1	Surface blinding under surface beds	m ³	22		
	A 11 B 11				
2	Surface blinding under and sides of raft beams	m ³	24		
	A 12 B 12				
<p><u>REINFORCED CONCRETE</u></p>					
<p><u>30MPa/19mm concrete</u></p>					
3	Surface beds	m ³	86		
	A 43 B 43				
4	Raft Beams	m ³	74		
	A 37 B 37				
5	Vanity slabs, cupboard slabs, cover slabs, etc.	m ³	4		
	A 2 B 2				
<p><u>TEST BLOCKS</u></p>					
<p>Allow for all necessary concrete test cubes size 150 x 150 x 150mm cast from batches of concrete required for the entire contract as specified, made, stored, cured and tested in accordance with SABS Methods 861 and 863, including use of approved cube moulds, transporting to an approved testing laboratory for testing, paying all charges and submitting reports to the Director.</p>					
<p><u>Test blocks:</u></p>					
6	Making and testing 150 x 150 x 150mm concrete strength test cubes (Provisional)	No	84		
	A 42 B 42				
<p><u>FINISHING TOP SURFACES OF CONCRETE</u></p>					
<p><u>Finishing top surfaces of concrete smooth with a wood float to give a Class U2 non-slip finish :</u></p>					
7	Surface beds, slabs, etc.	m ²	546		
	A 273 B 273				
Carried to Collection					
				R	
<p>Bill No. 2 Concrete, Formwork And Reinforcement</p>					

		Unit	Quantity	Rate	Amount
<u>CONCRETE SUNDRIES</u>					
<u>Thicken out surface beds, etc.</u>					
8	Thicken out edge of 100mm thick surface bed to a total thickness of 200mm for a width of 350mm, including all necessary excavation, surface preparation, additional concrete (30mPa/19mm) and formwork (formwork to exposed edges elsewhere measured) (Provisional)	m	94		
	A 47 B 47				
<u>SMOOTH FORMWORK (DEGREE OF ACCURACY II) (CPAP WORK GROUP NO. 111)</u>					
<u>Smooth formwork to sides</u>					
9	Edges, risers, ends and reveals not exceeding 300mm high or wide	m	330		
	A 165 B 165				
<u>Smooth formwork to soffits</u>					
10	Vanity slabs, cupboard slabs, cover slabs, etc. propped up not exceeding 1,5m high	m ²	20		
	A 10 B 10				
<u>Smooth formwork to form</u>					
11	Rectangular shaped opening for drop sink size 810 x 410mm wide through 75mm vanity slab.	No	12		
	A 6 B 6				
<u>MOVEMENT JOINTS, ETC. (Provisional)</u>					
<u>Expansion joints with 10mm softboard between vertical concrete and brick surfaces</u>					
12	10mm joints not exceeding 300mm high.	m	518		
	A 259 B 259				
<u>REINFORCEMENT (PROVISIONAL) (CPAP WORK GROUP NO. 114)</u>					
<u>Mild steel reinforcement to structural concrete work</u>					
13	Bars of Various diameter	Tonnes	1.18		
	A 0.59 B 0.59				
<u>High tensile steel reinforcement to structural concrete work</u>					
14	Bars of various diameter	Tonnes	3.14		
	A 1.57 B 1.57				
<u>Fabric reinforcement</u>					
15	Type 193 fabric reinforcement in concrete vanity slabs etc.	m ²	24		
	A 12 B 12				
Carried to Collection					
				R	
Bill No. 2					
Concrete, Formwork And Reinforcement					

16	Type 245 fabric reinforcement in concrete surface beds etc.	Unit	Quantity	Rate	Amount
A	246	B	246	m ²	492
Carried to Collection					R

Amount

BILL NO. 2
CONCRETE, FORMWORK AND REINFORCEMENT
COLLECTION

Page No

Brought Forward from Page

5

6

7

8

9

Carried to Summary

R

Unit Quantity Rate Amount

BILL NO. 3
MASONRY

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

SUPPLEMENTARY PREAMBLES

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

BRICKWORK

Sizes in descriptions

Where sizes in descriptions are given in brick units, 'one brick' shall represent the length and 'half brick' the width of a brick.

Carried to Collection

R

Bill No. 3
Masonry

		Unit	Quantity	Rate	Amount
<u>Samples</u>					
Samples of all masonry building units, except those for walls described as "load bearing", shall consist of a minimum of 6 units. Samples of building units to be used in walls described as "load bearing", shall consist of 30 units from every 30 000 units delivered to site.					
<u>BRICKWORK IN SUPERSTRUCTURE</u>					
<u>Brickwork of NFP bricks in class II mortar</u>					
1	Half brick walls	m ²	214		
	A 107 B 107				
2	Half brick walls in beamfilling	m ²	82		
	A 41 B 41				
3	One brick walls	m ²	568		
	A 284 B 284				
4	One brick walls in firewalls above ceilings to underside of roofing (Provisional)	m ²	132		
	A 66 B 66				
<u>BRICKWORK SUNDRIES</u>					
<u>Bagging & sealing of 1:3 cement and sand mixture</u>					
5	On brick walls, piers, etc.	m ²	568		
	A 284 B 284				
<u>Expansion joints with 10mm softboard between vertical concrete and brick surfaces</u>					
6	10mm joints not exceeding 300mm high.	m	48		
	A 24 B 24				
<u>Brickwork reinforcement</u>					
7	75mm Wide reinforcement built in horizontally	m	928		
	A 464 B 464				
8	150mm Wide reinforcement built in horizontally	m	3 048		
	A 1524 B 1524				
<u>Prestressed fabricated lintels</u>					
9	102 x 70mm Lintels in lengths not exceeding 3m	m	196		
	A 98 B 98				
<u>Turning pieces</u>					
10	230mm Wide turning piece to lintels, etc.	m	46		
	A 23 B 23				
<u>Galvanised wire ties etc. (Provisional)</u>					
11	30 x 1.6mm Roof tie 1.6m long with one end built into brickwork and other end fixed to timber	No	144		
	A 72 B 72				
Carried to Collection					
				R	
Bill No. 3 Masonry					

Amount

BILL NO. 3
MASONRY
COLLECTION

Page No

Brought Forward from Page

11

12

13

Carried to Summary

R

Unit Quantity Rate Amount

BILL NO. 4
WATERPROOFING

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

Supplementary Preambles

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

Waterproofing

Waterproofing of roofs, basements, etc. shall be laid under a ten year guarantee. Waterproofing to roofs shall be laid to even falls to outlets etc. with necessary ridges, hips and valleys. Descriptions of sheet or membrane waterproofing shall be deemed to include additional labour to turn-ups and turn-downs

Carried to Collection

R

Bill No. 4
 Waterproofing

		Unit	Quantity	Rate	Amount
<u>Proprietary branded products:</u>					
Proprietary branded products are to be applied in strict accordance with the manufacturers instructions. Should the manufacturers instructions be found not to have been followed in any process relating to the product in relation to, but not limited to transportation, application (rates and methodology), treatment of existing surfaces etc., then all liability for such product shall be transferred to the appointed Main Contractor.					
<u>DAMP-PROOFING OF WALLS AND FLOORS</u>					
<u>One layer 375 micron Consol Plastics Brikgrip embossed dampproof course</u>					
1	In walls	m ²	68		
	A 34 B 34				
2	Under ridge tiles	m ²	20		
	A 10 B 10				
3	Under sills, over lintols, etc.	m ²	32		
	A 16 B 16				
<u>250mm Polyolefin Membrane</u>					
4	Under surface beds and to under and sides of Raft Beams	m ²	1 256		
	A 628 B 628				
<u>EXPANSION JOINTS (PROVISIONAL)</u>					
<u>Sikaflex Pro 2HP polyurethane sealing compound including primer, etc.</u>					
5	10 x 10mm In joints between concrete floors and brickwalls	m	438		
	A 219 B 219				
<u>WATERPROOFING TO ROOFS</u>					
<u>Acrylic waterproofing</u>					
6	To concrete tiled roofs around 250mm diameter "Whirlybird" vent pipe	No	6		
	A 3 B 3				
<u>JOINT SEALANTS, ETC</u>					
<u>"Bostik" silicone sealant :</u>					
7	In joints between steel frames and walls	m	770		
	A 385 B 385				
Carried to Collection					
				R	
Bill No. 4					
Waterproofing					

Amount

BILL NO. 4
WATERPROOFING
COLLECTION

Page No

Brought Forward from Page

15

16

Carried to Summary

R

Unit Quantity Rate Amount

BILL NO. 5
ROOF COVERINGS

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

Supplementary Preambles

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

Carried to Collection

R

Bill No. 5
 Roof Coverings

Unit Quantity Rate Amount

HANDLING AND STORAGE

The Contractor shall ensure that all materials used on site for roofing/cladding, be transported, handled and stored in accordance with the manufacturer's recommendations. Material damaged shall be rejected and replaced with undamaged material at the Contractor's expense. Repair of damaged material will not generally be permitted. Rates are to include for preventing damage and protecting sheets through all stages of construction.

TILED ROOF

Interlocking "Coverland Renown" Slate Grey Concrete Roof tiles laid on sisalation (elsewhere measured) and nailed through sisalation with non-corrosive tile nails and/or fixed with suitable non-corrosive clips as required nailed through sisalation to and including 38 x 38mm sawn softwood battens at 320mm centres

1	Roof covering with pitches not exceeding 25 degrees A 280 B 280	m ²	560		
2	Ridges of tiles to match roofing tiles, bedded and pointed in 1:3 cement mortar tinted to match tile colour A 25 B 25	m	50		
3	Extra on roof covering for double course at eaves. Including 50 x 50mm sawn softwood tilting fillets A 50 B 50	m	100		

ROOF AND WALL INSULATION (CPAP WORK GROUP NO. 122)

"Sisalation 430 FR" industrial grade fire rated insulation with 150mm lapped and sealed joints

4	Insulation sheeting laid taut over rafters (at approximately 750mm centres) and fixed concurrent with tiling battens, purlins, etc, A 189 B 189	m ²	378		
---	---	----------------	-----	--	--

Carried to Collection

R

Amount

BILL NO. 5
ROOF COVERINGS
COLLECTION

Page No

Brought Forward from Page

18

19

Carried to Summary

R

Unit Quantity Rate Amount

BILL NO. 6
CARPENTRY AND JOINERY

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

SUPPLEMENTARY PREAMBLES

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Contractor to furnish Truss TR1 & TR2 certificates of compliance to the Principal Agent.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

Joinery

Descriptions of frames shall be deemed to include frames, transomes, rails, etc.

Carried to Collection

R

Bill No. 6
 Carpentry And Joinery

		Unit	Quantity	Rate	Amount
<u>ROOFS ETC</u>					
<u>Sawn softwood</u>					
1	38 x 114mm Wall plates	m	96		
	A 48 B 48				
<u>Wrought softwood</u>					
2	50 x 50 x 150mm Hangers (fixed to rafter feet to receive stiffening purlins at fascias)	No	144		
	A 72 B 72				
3	76 x 50mm Trimmer batten at gables fixed under purlin ends (to receive barge board)	m	48		
	A 24 B 24				
4	76 x 50mm Gable trim	m	48		
	A 24 B 24				
5	50 x 50mm Stiffening purlins fixed in lengths between trusses (at fascias) (trusses at 1450mm centres)	m	100		
	A 50 B 50				
<u>Sundries</u>					
6	Wrought faces on sawn timbers	m ²	122		
	A 61 B 61				
<u>PLATE NAILED TIMBER ROOF TRUSS CONSTRUCTION</u>					
<u>Specification:</u>					
The trusses,etc. shall be approved Engineering designed trusses, manufactured from South African sawn pine as described, including hoisting and fixing in					
The trusses shall conform to the drawings, details and the following in all aspects :					
<u>Treatment of timber :</u>					
Prices are to include for treating timber as defined in Government Gazette (Notice No. R.2577 of 29th December 1978), and any amendments thereto.					
<u>Timber and Materials :</u>					
The minimum requirements for all timber shall be merchantable grade (SABS 563).					
<u>Finish on connector plates :</u>					
Connector plates are to have at least two coats of epoxy tar finish. (for coastal areas)					
Carried to Collection				R	
Bill No. 6 Carpentry And Joinery					

Unit Quantity Rate Amount

Design :

The materials and the design of the roof construction must be in accordance with the relevant editions of the SABS (Viz. SABS 0163- 1980 : Code of Practice for the design of Timber Structures and the latest recommendations of the National Timber Research Institute of the CSIR.

PRETREATMENT OF TIMBER

This service falls within the areas defined in the National Building Regulations for Treatment of Timber against insect pest affecting softwood fixed permanently in all buildings.

The Regulations require that timber be treated in terms of SABS 05 and to comply with SABS 457, 753, 754 or 1288 as relevant. Tenderers are to make allowance in their rates.

PREFABRICATED ROOF TRUSSES, ETC.

All timber roof trusses including nail-plated trusses and bolted trusses with lapped members must comply with SABS 0243 : THE DESIGN, MANUFACTURE AND ERECTION OF TIMBER TRUSSES.

Prices for roof trusses are to include for all temporary bracing and supports and for all necessary top and bottom chord bracing, wind bracing and runners where required and overhanging ends are to be wrot faced all round.

Rates for timber roof trusses shall include for 'Teco' hurricane clips and 2.5mm diameter double strand galvanised wire tie 550mm girth wrapped around rafter and purlin with ends tied together at every intersection of purlins and trusses.

The top chord dead loading to be sufficient to support roofing, purlins, insulation, etc. The bottom chord dead loading to be sufficient to support ceilings, bracing and bracing timbers, etc. The eaves dead-loading at each end of the truss to be sufficient to support fascias, gutters and fixings, etc.

Live load and wind loads are to be in accordance with SABS 0160-v1989 as amended.

The design of the trusses and permanent bracing must be carried out under the control of a registered engineer. All calculations and drawings, including a key-plan of each building, showing the position of each type of bracing must be submitted timeously to the project Engineers, for their approval, before fabrication is commenced.

Carried to Collection

R

Unit Quantity Rate Amount

(Note that fire-walls (if any) affect the number of braced bays required.)

Dimensions and setting out :

The setting out, spacing and overall dimensions of the roof trusses are shown on the drawings.

The dimensions in the descriptions of the trusses are nominal and are measured on plan, and all actual truss measurements and dimensions shall be obtained from the Architect or measured on site prior to commencement of design or fabrication.

Bracing :

Prices to include for adequate temporary bracing during construction to the approval of the Engineer. Allowance for permanent bracing have been measured separately.

Hoisting :

Prices to include for hoisting and setting up in position, strictly in accordance with the manufacturer's instructions.

Drawings :

The references given in the descriptions are to the respective types of trusses detailed on the Architect's drawings accompanying these Bills of Quantities for tender purposes.

Fixing

Items described as 'nailed' shall be deemed to be fixed with hardened steel nails or pins, or to be shot-pinned, to brickwork or concrete.

Manufacturer of Trusses :

All trusses to be fabricated by a truss fabricator who has been awarded a Certificate of Competence by the Institute for Timber Construction.

Erection of Trusses :

All trusses and sundry roof material to be erected by a roof erector who has been awarded a Certificate of Competence by the Institute for Timber Construction.

Certificate of Competence :

A Certificate, from an independent professional engineer, must be provided to the Architect after the erection of the trusses, stating that the design, erection and bracing of the trusses are in accordance with the specified standards.

Carried to Collection

R

Unit Quantity Rate Amount

Complete roof structure, including hips and valleys, valley rafters and hip rafters, linings, jack rafters, permanent bracing, battens etc.

The following Trusses to be hoisted and fixed in position approximately 2635mm above floor level

7 Complete hipped roof structure to single storey **Staff Accommodation - 6 Bedroom Unit** (building size 24180 x 10175mm overall), comprising double pitched (22 degree pitch) roof trusses with 1500mm eaves overhang (both sides) (size of roof 269.28m2 measured flat on plan, including overhangs)

No 2

A 1 B 1

All bracing, cross bracing, etc.

8 All bracing, cross bracing, connecting clips, fixing brackets, hurricane clips, etc. ,as required for fixing in position of roof trusses as described in accordance with the manufacturer's instructions to **Staff Accommodation - 6 Bedroom Unit**

Item

Item 1

EAVES, VERGES, ETC

Pressed Nutec cement

9 12 x 225mm Fascias boards (Everite 041-202), including aluminium H-profile jointing strips (Everite 685-195)

m 100

A 50 B 50

10 80 x 200mm barge boards (Everite 521-731 socket less), including aluminium H-profile jointing strips (Everite 685-187).

m 48

A 24 B 24

SKIRTINGS

Wrought meranti

11 19 x 76mm Arris rounded and ploughed at back Skirtings board plugged and screwed to wall.

m 394

A 197 B 197

DOORS, FANLIGHTS, etc.

Wrought meranti doors

12 44mm "Blaco" Framed, ledged and braced batten stable door size 813 x 2032mm high comprising 40 x 110mm wide top rail and stiles, 20 x 150mm middle ledge, 20 x 225mm bottom ledge and 20 x 110mm braces, filled in with 20mm v-joint one side boarding. (D1)

No 12

A 6 B 6

Carried to Collection

R

Bill No. 6

Carpentry And Joinery

Amount

BILL NO. 6
CARPENTRY AND JOINERY
COLLECTION

Page No

Brought Forward from Page

21

22

23

24

25

26

Carried to Summary

R

Unit Quantity Rate Amount

BILL NO. 7
CEILING PARTITIONS AND ACCESS FLOORING

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

SUPPLEMENTARY PREAMBLES

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/alterd. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

Descriptions

Items described as 'nailed' shall be deemed to be fixed with hardened steel nails or pins, or to be shot-pinned, to brickwork or concrete.

Carried to Collection

R

Bill No. 7
 Ceilings Partitions And Access Flooring

Amount

BILL NO. 7

CEILINGS PARTITIONS AND ACCESS FLOORING

COLLECTION

Page No

Brought Forward from Page

28

29

Carried to Summary

R

Bill No. 7

Ceilings Partitions And Access Flooring

Unit Quantity Rate Amount

BILL NO. 8
JOINERY FITTINGS

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

Supplementary Preambles

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

Fixing:

Items described as 'nailed' shall be deemed to be fixed with hardened steel nails or pins, or to be shot-pinned, to brickwork or concrete

Carried to Collection

R

Bill No. 8
 Joinery Fittings

Unit Quantity Rate Amount

PRETREATMENT OF TIMBER

This service falls within the areas defined in the National Building Regulations for Treatment of timber against insect pest affecting softwood fixed permanently in all buildings.

The Regulations require that timber be treated in terms of SANS as relevant. Bidders are to make allowance in their rates.

JOINERY FITTINGS

General

The following in built-in units :

Tenderers are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, tenderers are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

The following cupboard fittings have been measured as complete units, i.e. the components of the units have not been separately measured. The descriptions of such units shall be deemed to include all components, assembling, housing, notching, gluing, blocking, planting on and screwing with countersunk brass screws, edge strips, decorative plastic finish, glass, ironmongery, metalwork, paint or varnish finishes, etc.

Drawings/References

The references given in the descriptions are to the respective types of fittings detailed on the architect's drawings accompanying these Bills of Quantities for tender purposes.

Kitchen units

Note :

All boards to kitchens and sink cupboards to be waterproof particle board.

Supplementary Specification

Built in cupboards to be formed of 20mm superwood shelves, divisions and doors all built into plastered brick and concrete enclosure, plastered brick and concrete enclosure measured elsewhere and complete with all necessary cleats, brackets, fixings, etc for fixing to walls.

Carried to Collection

R

	Unit	Quantity	Rate	Amount
<u>Shelves and Doors:</u>				
Shelves and doors shall be formed of 20mm superwood pre-drilled and grooved for assembly.				
<u>Carcass :</u>				
Carcass shall be of 32 x 16mm SA pine planned all around with sides pre-drilled and grooved for assembly.				
Framework plugged to walls and floors.				
<u>Handles :</u>				
96mm Satin Chrome "D-Handles" (B2652 SC) by Buildware Group. Fixed to door or drawer fronts with screws.				
<u>Hinges :</u>				
Hinges shall be of the concealed type (B2518 NP) by Buildware Group, fitted to redrilled floor and wall units.				
Finishes :				
All timber to be sanded, stopped, prepared, etc. with one universal undercoat and 2 coats Plascon Velvagio with the final coat applied after installation and the rates to include for the cost of all finishes, etc.				
<u>KITCHEN FLOOR UNITS</u>				
1	No	12		
Kitchen sink floor cupboard size 2600 x 580 x 900mm high extreme one shelf and hinged doors (8 off doors) (sink elsewhere measured) (Drawing 001-017-wm-201).				
A 6 B 6				
<u>Bedroom Cupboards</u>				
<u>Built in cupboards formed of 20mm SA Pine shelves and divisions with 2 coats of clear varnish all built into plastered brick enclosure, (plastered brick enclosure measured elsewhere) and complete with all necessary cleats, brackets, fixings, etc for fixing to walls</u>				
2	No	12		
Bedroom clothes cupboard, overall size 1085 x 600 x 2635mm high with one top shelf size 1085 x 600mm, one divisions size 1580 x 600mm and 4 shelves size 500 x 600mm each and complete with one hanging rail 585mm long, all as per architects detail- (Drawing 001-017wm-201)				
A 6 B 6				
			Carried to Collection	R
Bill No. 8				
Joinery Fittings				

Amount

BILL NO. 8
JOINERY FITTINGS
COLLECTION

Page No

Brought Forward from Page

31

32

33

Carried to Summary

R

Unit Quantity Rate Amount

BILL NO. 9
IRONMONGERY

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

SUPPLEMENTARY PREAMBLES

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/alterd. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

Carried to Collection

R

		Unit	Quantity	Rate	Amount
8	Brass number 50mm high	No	12		
	A 6 B 6				
9	150 x 150mm Anodised aluminium pictogram set with fire hose reel symbol (IF2 and IF4)	No	4		
	A 2 B 2				
	<u>PELMETS AND CURTAIN TRACKS</u>				
	<u>"Kirsch" Curtain tracks</u>				
10	Single curtain track complete with rollers, brackets, returned ends, etc. plugged	m	46		
	A 23 B 23				
	<u>BATHROOM FITTINGS</u>				
11	19mm Diameter chromium plated shower curtain rail 1200mm long, including end brackets (Solid 260)	No	12		
	A 6 B 6				
12	"Franke" chromium plated towel rail (Code BHM9B), 600mm long, including end brackets	No	12		
	A 6 B 6				
13	"Franke" chrome toilet roll holder (Code BS 677)	No	12		
	A 6 B 6				
14	" Franke" soap tray with hooks (Code BS 649) (shower)	No	12		
	A 6 B 6				
15	1/2" x 85mm diameter and No. 033CP adjustable holder.	No	12		
	A 6 B 6				
	<u>SUNDRIES</u>				
	<u>Door Sundries</u>				
16	Rubber tipped hat and coat hook ("Union" Code: AL8722AS) fitted with 2 brass screws.	No	12		
	A 6 B 6				
17	Door stop (Union AL 8730 AS) plugged	No	36		
	A 18 B 18				
	<u>"Genesis" standard aluminium</u>				
18	12mm Edge protector (Genesis EMA 120) fixed at thresholds	m	10		
	A 5 B 5				
	<u>PVC Shower Curtain complete with rings fitted to shower rail</u>				
19	Shower curtain for opening size 1200 x 2100mm high	No	12		
	A 6 B 6				
	Carried to Collection			R	
	Bill No. 9				
	Ironmongery				

Amount

BILL NO. 9
IRONMONGERY
COLLECTION

Page No

Brought Forward from Page

35

36

37

Carried to Summary

R

Unit Quantity Rate Amount

BILL NO. 10
METALWORK

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

SUPPLEMENTARY PREAMBLES

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

Descriptions

Descriptions of bolts shall be deemed to include nuts and washers.

Descriptions of expansion anchors and bolts and chemical anchors and bolts shall be deemed to include nuts, washers and mortices in brickwork or concrete.

Carried to Collection

R

Bill No. 10
 Metalwork

	Unit	Quantity	Rate	Amount
<p>Metalwork described as 'holed for bolt(s)' shall be deemed to include the bolts unless otherwise described.</p> <p><u>Rates shall include for the following:</u></p> <p>Suitably protecting all exposed aluminium and glass surfaces with an approved protection tape and plastic sheeting. Such protection is to be removed at completion of the contract and the exposed surfaces cleaned down and left perfect. Under no circumstances will any damage whatsoever to the finished product be accepted.</p> <p>Building in and fixing into preformed openings. Window opening sizes to be verified on site before windows can be manufactured.</p> <p>Complete ironmongery to all aluminium doors and windows</p> <p>Complete glazing as described with and including matching aluminium glazing beads and gaskets and glazed in accordance with the manufacturer's written instructions.</p> <p>All opening and fixed lights, coupling mullions and transoms, fittings, ironmongery, etc. As required.</p> <p><u>Powdercoated aluminium windows, doors, etc.:</u></p> <p><u>Bidders are advised to refer to the architects window and door schedules, as these will take precedence and rates will be deemed to be based in the schedules should there be any discrepancy</u></p> <p>Bidders are to note that prices for aluminium doors and windows are to include for all necessary ironmongery for the complete installation as required. No further claims in this regard will be entertained.</p> <p>Items shall be manufactured by an approved specialist who shall provide a sample upon request, for approval by the Principal Agent, at no additional cost to the contract.</p> <p><u>Anodising:</u></p> <p>All anodising shall be executed in strict accordance with SANS 999. Grade AA25 (Average coating thickness 25 micron) shall be used. Colour to be agreed with Architect.</p> <p><u>Welded joints and intersections:</u></p> <p>Prices of balustrades, burglar guards and the like shall include for framed and welded joints and intersections.</p> <p>Prices of continuous hollow section and solid section shall include for welded joints in the length and prices of intersections shall include for all cutting, mitering, scribing, shaping, welding, bends, knees, ramps, etc.</p> <p style="text-align: right;">Carried to Collection</p>				
<p>Bill No. 10 Metalwork</p>			R	

Unit Quantity Rate Amount

Hot dipped galvanising:

The mass of hot dip galvanised steelwork has been calculated on the mass before galvanising and no allowance has been made for the additional mass of galvanising for which allowance must be made in pricing.

Unless otherwise stated, all steelwork described as galvanised shall be deemed to include for 'hot-dip' galvanising in accordance with the latest SANS standards.

Screws and bolts:

Screws and bolts shall be of corresponding metal and colour and heads of screws shall be countersunk. Self-tapping screws shall, unless otherwise described, be used for screwing items to adjoining metalwork. Stainless steel screws shall be used for fixing aluminium. Items fixed to adjoining metalwork with rivets, self-tapping screws, set screws, machine screws, etc. shall include for all necessary drilling.

Where bolting is specified, projecting shank ends of bolts shall be cut flush and left smooth.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

GALVANISED PRESSED STEEL DOOR FRAMES

1,2mm Double rebated frames suitable for half brick walls.

1 Frame for door 813 x 2032mm high, including pair of steel butts.

A 18 B 18

No 36

ALUMINIUM WINDOWS, DOORS, ETC. (CPAP WORK GROUP NO. 140)

General Specifications

Note:

Items shall be manufactured by an approved specialist who shall provide a sample upon request, for approval by the Principal Agent.

Tenderers are advised to refer to the architects window and door schedules.

Carried to Collection

R

Bill No. 10
Metalwork

	Unit	Quantity	Rate	Amount
<p>Tenderers are to note that should there be any doubt or obscurity as to the meaning and intent of any descriptions, the Contractor must have the same rectified and allow for accordingly in his tender. The Contractor is to include in the rates for all that he/she considers necessary for the proper construction of the windows and doors. No claims whatsoever will be afterwards admitted due to the Contractor having failed to comply with these conditions.</p> <p>Tenderers are to note that prices for aluminium doors and windows are to include for all necessary ironmongery for the complete installation as required. No further claims in this regard will be entertained.</p> <p><u>Rates shall include for the following:</u></p> <p>All openings and fixed lights, coupling mullions and transoms, fittings, ironmongery, etc. As required.</p> <p>Complete glazing as described with and including matching aluminium glazing beads and gaskets and glazed in accordance with the manufacturer's written instructions.</p> <p>Building in and fixing into performed openings. Window opening sizes to be verified on site before windows can be manufactured.</p> <p>Suitably protecting all exposed aluminium and glass surfaces with an approved protection tape and plastic sheeting. Such protection is to be removed at completion of the contract and the exposed surfaces cleaned down and left perfect. Under no circumstances will any damage whatsoever to the finished product be accepted.</p> <p><u>Drawings :</u></p> <p>Tenderers are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, tenderers are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.</p> <p>Frames to be anodised Anolok Bronze 543 aluminium 30mm crimped frame and 45 degree angle bead.</p> <p>4mm Float glass with clip-on glazing beads with neoprene seals.</p> <p>Precision- moulded, corrosion-resistant handles and catches.</p>				
<p style="text-align: right;">Carried to Collection</p> <p>Bill No. 10 Metalwork</p>			R	

	Unit	Quantity	Rate	Amount
<p><u>"Duro Residential", Anodised Anolok Bronze 543 aluminium window frames with top hung opening sashes, glazed with 4mm clear float glass and plugged to brickwork or concrete. All Windows to be fitted with brown powder coated burglar guards "Duro DIY", fixed with security screws.</u></p>				
2	No	24		
<p>Window type PT 1212 size 1200 x 1200mm high (W1) A 12 B 12</p>				
<p><u>"Duro Residential", Anodised Anolok Bronze 543 aluminium window frames with top hung opening sashes, glazed with 4mm obscure safety glass and plugged to brickwork or concrete. All Windows to be fitted with brown powder coated burglar guards "Duro DIY", fixed with security screws.</u></p>				
3	No	12		
<p>Window type PT 69 size 600 x 900mm high (W2) A 6 B 6</p>				
<p><u>Anodised Anolok Bronze 543 aluminium framed mosquito screens over opening sashes</u></p>				
4	No	12		
<p>To Window W2 type PT 69 size 600 x 900mm high A 6 B 6</p>				
5	No	24		
<p>To Window W1 type PT 1212 size 1200 x 1200mm high A 12 B 12</p>				
Carried to Collection			R	

Amount

BILL NO. 10
METALWORK
COLLECTION

Page No

Brought Forward from Page

39

40

41

42

43

Carried to Summary

R

Unit Quantity Rate Amount

BILL NO. 11
PLASTERING

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

Supplementary Preambles

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

Carried to Collection

R

Bill No. 11
 Plastering

Unit Quantity Rate Amount

Preparation

For granolithic applied monolithically, the concrete floor shall be swept clean after bleeding of the concrete has ceased and the slab has begun to stiffen; any remaining bleed water shall be removed and the granolithic applied immediately thereafter. For granolithic to be bonded to the floor slab after it has hardened, the slab surface shall be hacked (preferably by mechanical means) until all laitance, dirt, oil, etc. is dislodged and swept clean of all loose matter. The slab shall then be wetted and kept damp for at least six hours before applying the granolithic.

Mix

Granolithic shall attain a compressive strength of at least 41MPa. The coarse aggregate shall comply with SANS 1083 and shall generally be capable of passing a 10mm mesh sieve. Where the thickness of the granolithic exceeds 25mm, the size of the coarse aggregate shall be increased to the maximum size compatible with the thickness of the granolithic.

Panels

Where possible joints between panels shall be positioned over joints in the floor slab and shall be at least 3mm wide through the full thickness of the finish, separated by strips of wood or fibreboard and finished with V-joints

Laying

Monolithic granolithic shall be applied to the partially set slab and thoroughly compacted and lightly wood floated to the required levels

Bonded granolithic shall be applied to the slab after applying a 1:1 sand-and-cement slurry brushed over the surface and allowed to partially set before applying the granolithic. The granolithic shall be thoroughly compacted and lightly wood floated to the required levels

After wood floating, the monolithic and bonded granolithic shall remain undisturbed until bleeding has ceased and the surface has stiffened. Any remaining bleed water and laitance shall then be removed and the surface steel trowelled or power floated

Curing, seasoning and protection

Granolithic shall be covered with clean hessian with waterproof building foil over and kept wet for at least seven days after laying.

Carried to Collection

R

		Unit	Quantity	Rate	Amount
	<u>Colour</u>				
	Coloured granolithic shall be tinted with an approved colouring pigment mixed into a true and even colour.				
	<u>SCREEDS</u>				
	<u>3:1 Cement plaster screeds wood floated, on concrete</u>				
1	25mm Thick on floors and landings A 175 B 175	m ²	350		
	<u>GRANOLITHIC</u>				
	<u>Dark Grey tinted granolithic on brickwork</u>				
2	25mm Thick on sloping top and side of thresholds 400mm girth including bedding in aluminium weather bar (weather bar elsewhere measured) A 5 B 5	m	10		
	<u>Dark Grey tinted granolithic, on concrete</u>				
3	Average 50mm thick on floors to falls A 71 B 71	m ²	142		
4	25mm Thick on vanity slabs, cover slabs etc A 10 B 10	m ²	20		
5	25mm Thick on narrow widths A 2 B 2	m ²	4		
	<u>INTERNAL PLASTER</u>				
	<u>Cement plaster on brickwork or concrete (1:4)</u>				
6	On walls A 529 B 529	m ²	1 058		
7	On narrow widths A 8 B 8	m ²	16		
8	On narrow widths not exceeding 300mm high A 280 B 280	m	560		
	<u>EXTERNAL PLASTER</u>				
	<u>Cement plaster on brickwork (1:4)</u>				
9	On walls A 266 B 266	m ²	532		
10	On narrow widths A 5 B 5	m ²	10		
	Carried to Collection			R	
	Bill No. 11 Plastering				

Amount

BILL NO. 11
PLASTERING
COLLECTION

Page No

Brought Forward from Page

45

46

47

Carried to Summary

R

Unit Quantity Rate Amount

BILL NO. 12

TILING

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for completion conformance in all respects to the requirements of SANS 10400.

Supplementary Preambles

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

Carried to Collection

R

Bill No. 12
Tiling

		Unit	Quantity	Rate	Amount
Fixing					
Unless described as 'fixed with adhesive to plaster (plaster elsewhere)' or 'fixed with adhesive to screed (screed elsewhere)' descriptions of tiling on brick or concrete walls, columns, etc. shall be deemed to include 1:4 cement plaster backing and descriptions of tiling on concrete floors etc. shall be deemed to include 1:3 cement screed.					
Tiling described as 'fixed with adhesive on power floated concrete' shall be deemed to include for approved tiling key-coat					
Ceramic, porcelain, marble and granite tiles are to be fixed and grouted with suitable adhesives and grouts as recommended by the manufacturer of the tiles					
WALL TILING					
<u>200 x 200mm "JOHNSON White" ceramic wall tiles fixed with adhesive to plaster (plaster elsewhere) and flush pointed with anti-bacterial grouting</u>					
1	On plastered walls including waterproofing to walls with "Tal sureproof" prior to fixing tiles	m ²	106		
	A 53 B 53				
2	On walls in isolated panels, splashbacks, etc.	m ²	18		
	A 9 B 9				
3	On vanity slabs in isolated panels including cutting around basins	m ²	20		
	A 10 B 10				
4	On narrow widths	m ²	4		
	A 2 B 2				
5	Fair exposed cutting and fitting around pipe not exceeding 100mm internal diameter (Provisional)	No	36		
	A 18 B 18				
6	Fair exposed cutting and fitting around pipe exceeding 100mm and not exceeding 200mm internal diameter (Provisional)	No	12		
	A 6 B 6				
<u>"Genesis Regular ETP 908" PVC corner trim</u>					
7	2.2.External corner trim	m	162		
	A 81 B 81				
Carried to Collection					
				R	
Bill No. 12					
Tiling					

		Unit	Quantity	Rate	Amount
FLOOR TILING					
<u>330 x 330mm Johnson "Barista chai latte BS-934" class 4 tiles laid on screed with "Tal Professional" tile adhesive. Joints to be 10mm wide grouted with "Tal Quarrygrout" dark grey.</u>					
8	On floors and landings	m ²	228		
	A 114 B 114				
<u>330 x 330mm Ceramic floor tiles as "Johnson Granito Mid Grey (GN 572)" fixed with "Tal Professional" adhesive to bedding (bedding elsewhere) and flush pointed with "Tal Quarrygrout" dark grey grout.</u>					
9	On floors and landings	m ²	34		
	A 17 B 17				
<u>330 x 330mm Ceramic floor tiles as "Johnson Granito Charcoal (GN 553)" adhesive to bedding (bedding elsewhere) and flush pointed with "Tal Quarrygrout" dark grey grout.</u>					
10	Skirting 150mm high	m	72		
	A 36 B 36				
<u>45 x 45mm Black Ceramic Mosaic floor tiles fixed with "Tal Goldstar 6", adhesive to bedding (bedding elsewhere) and flush pointed with anti-bacterial dark grey epoxy mortar.</u>					
11	On shower floors and including "Tal Sureproof" applied to floors prior to fixing of mosaic tiles	m ²	12		
	A 6 B 6				
12	Fair exposed cutting and fitting around pipe not exceeding 100mm internal diameter	No	12		
	A 6 B 6				
Carried to Collection				R	
Bill No. 12					
Tiling					

Amount

BILL NO. 12
TILING
COLLECTION

Page No

Brought Forward from Page

49

50

51

Carried to Summary

R

Unit Quantity Rate Amount

BILL NO. 13
PLUMBING AND DRAINAGE

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

SUPPLEMENTARY PREAMBLES

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

Wire gratings

Descriptions of gutter outlets etc. shall be deemed to include wire balloon gratings.

Carried to Collection

R

Unit Quantity Rate Amount

Sealing of edges

Outer edges of sinks, basins, baths, urinals, etc. are to be sealed against adjacent surfaces with approved silicone- Class F20 HM, to EN ISO 11600.

uPVC pipes and fittings

Sewer and drainage pipes and fittings shall be jointed and sealed with butyl rubber rings. Soil, waste and vent pipes and fittings shall be solvent weld jointed or sealed with butyl rubber rings.

Pipes

Pipes shall be firmly fixed to walls, etc. with coloured nylon snap-in pipe clips with provision for accommodating thermal movement and jointed and fixed strictly in accordance with the manufacturer's instructions.

All pipe diameters are nominal external.

Polycop polypropylene pipes

Polypropylene pipes 54mm diameter and smaller shall be seamless copper coloured Class 16 pipes jointed with Fast-fuse heat welded thermoplastic or where so described Polylock compression fittings Pipes shall be firmly fixed to walls, etc. with coloured nylon snap-in pipe clips with provision for accommodating thermal movement and jointed and fixed strictly in accordance with the manufacturer's instructions.

Copper pipes

Pipes shall be hard drawn and half-hard Maksal pipes of the class described. Class 0 (thin walled hard drawn) pipes shall not be bent. Class 1 (thin walled half-hard), Class 2 (half-hard) and Class 3 (heavy walled half-hard) pipes shall only be bent with benders with inner and outer formers. Fittings to copper waste, vent and anti-syphon pipes, capillary solder fittings and compression fittings shall be Cobra Watertech type, or other approved. Capillary solder fittings shall comply with ISO 2016.

Reducing fittings

Where fittings have reducing ends or branches they are described as 'reducing' and only the largest end or branch size is given. Should the contractor wish to use other fittings and bushes or reducers he may do so on the understanding that no claim in this regard will be entertained.

Carried to Collection

R

Unit Quantity Rate Amount

Fixing of pipes

Unless specifically otherwise stated, descriptions of pipes shall be deemed to include fixing to walls, etc., casting in, building in or suspending not exceeding 1m below suspension level.

Disinfection of water pipework

Water pipework is to be disinfected at completion in accordance with SANS (provision for disinfection elsewhere).

Paper wrapping to pipes

Pipes chased into brickwork must be wrapped with two layers of stout brown paper tied with wire. Rates are to include for wrapping around joints and fittings.

Flush pans

Flush pans shall have straight or side outlets and "P" or "S" traps as necessary.

Stainless steel basins, sinks, wash troughs, urinals, etc.

Units shall have standard aprons on all exposed edges and tiling keys against walls where applicable.

Installation and Sealing:

Silicone sealant with anti-bacterial qualities shall be used between sanitary fitting and finished wall surface or cupboard for a secure and neat installation.

Waste unions/outlets :

Descriptions of waste unions/outlets shall be deemed to include rubber or vulcanite plugs and chains fixed to fittings.

Densyl petrolatum anti-corrosion tape as manufactured by Denso SA (Pty) Ltd.

Pipes to be taped shall be coated with the appropriate primer and the tape shall be applied in the appropriate widths and with 15mm laps per spiral unless otherwise described.

Couplings and fittings to pipes shall be taped in strict accordance with the manufacturer's instructions including mastic, tape, Layflat sheeting, securing of same, etc.

Prices for wrapping of pipes shall include for all work as described to couplings in the length.

Carried to Collection

R

	Unit	Quantity	Rate	Amount
<u>Grades of Pipes and fittings</u>				
The grades of all pipes and fittings called for, whether indicated or not, shall conform to the minimum requirements as stipulated in "The National Building Regulations" and as tested by the SABS and also in compliance with any regulations by Local Authorities.				
<u>General</u>				
Rates for installation of sanware and all drainage and supply piping of all types will be deemed to include for fair cutting around pipes and making good to floor and wall finishes.				
<u>SOIL DRAINAGE (CPAP WORK GROUP NO. 146)</u>				
<u>Pre-cast concrete gulleys</u>				
1	No	24		
110mm Gulley not exceeding 500mm deep				
A 12 B 12				
<u>SANITARY FITTINGS</u>				
Note : Restriction washers to be fitted to all ward and ablution sanitary fittings.				
<u>Franke Grade 304 (18/10) stainless steel</u>				
2	No	12		
"Franke" Quinline QLX611 inset sink and drainer size 1050 x 535mm wide with one end bowl, including plug and chain, silicon sealant around, etc.				
A 6 B 6				
3	No	12		
"Franke" Mini single washtrough (Code ET 101), including plug and chain, silicon sealing around, etc.				
A 6 B 6				
<u>White glazed vitreous china with Cobra Watertech accessories</u>				
4	No	12		
560 x 405mm vaal Springbok (Code 7031 - two tap configuration) vitreous china lavatory basin, including rawl bolted to wall on 2 semi-concealed cast iron brackets (Code 8118Z0), including basin waste plug, chain, chainstay and backnut, silicon sealing around, etc.				
A 6 B 6				
5	No	12		
Vaal Afsan Aquasave low level WC suite comprising white vitreous china outlet washdown pan (Code 755199) with P-trap and white delux heavy duty double flap hinged seat and 6 litre SISO cistern complete with vandal proof lid, fitments and flushpipe.				
A 6 B 6				
			R	
Carried to Collection				
Bill No. 13 Plumbing And Drainage				

		Unit	Quantity	Rate	Amount
<u>WASTE UNIONS/OUTLETS, ETC</u>					
<u>Chromium plated</u>					
6	32mm Basin waste outlet (Code 301)	No	12		
	A 6 B 6				
7	38mm Shower waste union	No	12		
	A 6 B 6				
8	40mm Bath, sink or urinal waste outlet (Code 316)	No	24		
	A 12 B 12				
<u>TRAPS ETC</u>					
<u>Marley PVC</u>					
9	38mm Deep seal "P" or "S" trap	No	24		
	A 12 B 12				
<u>Chromium plated (Cobra Watertech)</u>					
10	32 x 50mm Chromium plated bottle trap with tail pipe, capnut and wall flange (C-342/50)	No	12		
	A 6 B 6				
<u>Brass</u>					
11	40mm Shower trap, including CP grating (Cobra 373)	No	12		
	A 6 B 6				
<u>TAPS, VALVES, ETC</u>					
<u>Brass</u>					
12	15mm Bibtap (Code 100-15)	No	12		
	A 6 B 6				
<u>In-line stainless steel ball type valves with PTFE seat</u>					
13	15mm Stopcock (Ball O Fix)	No	84		
	A 42 B 42				
14	22mm Stopcock (Ball O Fix)	No	30		
	A 15 B 15				
15	22mm Non-return valve	No	6		
	A 3 B 3				
<u>Chromium plated (Cobra Watertech)</u>					
16	15mm Star pattern stopcock (Cobra 136-15)	No	12		
	A 6 B 6				
17	15mm shower cubicle set as Cobra 181 Star exposed mixer, complete with No. 020 swanneck overhead pipe 990mm high with 15mm x 85mm diameter adjustable holder (No. 033CP) and shower rose (No. 070CP)	No	12		
	A 6 B 6				
Carried to Collection					
				R	
Bill No. 13 Plumbing And Drainage					

		Unit	Quantity	Rate	Amount
	<u>Chromium plated (Cobra Star)</u>				
18	Star pattern pillartaps (Code 111)	No	24		
	A 12 B 12				
19	Single tap hole sink mixer set with overarm swivel outlet (Cobra 296)	No	12		
	A 6 B 6				
	<u>SANITARY PLUMBING</u>				
	<u>PIPES, ETC.</u>				
	<u>uPVC pipes</u>				
20	50mm Pipes	m	46		
	A 23 B 23				
21	50mm Pipes under floors	m	26		
	A 13 B 13				
22	110mm Pipes	m	22		
	A 11 B 11				
	<u>PIPE FITTINGS</u>				
	<u>Extra over uPVC pipes for fittings</u>				
23	50mm Bend	No	84		
	A 42 B 42				
24	50mm Access bend	No	36		
	A 18 B 18				
25	110mm Access bend	No	12		
	A 6 B 6				
26	110mm Junction	No	12		
	A 6 B 6				
27	110 X 50mm Reducing junction	No	12		
	A 6 B 6				
28	110mm Straight pan connector	No	12		
	A 6 B 6				
29	110mm Two- way vent valve	No	12		
	A 6 B 6				
	<u>WATER SUPPLIES</u>				
	<u>Hot and Cold Water Installation</u>				
	<u>PIPES, ETC</u>				
	<u>Copper pipes (class 460/2) with soldered joints</u>				
30	15mm Pipes	m	240		
	A 120 B 120				
31	22mm Pipes	m	232		
	A 116 B 116				
	Carried to Collection			R	
	Bill No. 13				
	Plumbing And Drainage				

		Unit	Quantity	Rate	Amount
42	250mm Diameter Tee to flexible ducting including all necessary jointing, etc. A 3 B 3 Testing, etc.	No	6		
43	Allow for testing the whole of the sanitary plumbing and water supplies to the satisfaction of the Principal Agent and Local Authorities. All defective work is to be taken out and replaced at the Contractor's expense and the whole re-tested until found satisfactory. Item 1	Item			
44	Upon completion of testing, certificates of compliance must be provided for the various plumbing installations. Item 1	Item			
Carried to Collection				R	

Amount

BILL NO. 13
PLUMBING AND DRAINAGE
COLLECTION

Page No

Brought Forward from Page

53

54

55

56

57

58

59

60

Carried to Summary

R

Unit Quantity Rate Amount

BILL NO. 14

GLAZING

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

Supplementary Preambles

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

Carried to Collection

R

Bill No. 14
Glazing

Unit Quantity Rate Amount

MIRRORS, ETC

6mm Glass mirror with straight bevelled edges, holed for and fixed with chromium plated dome capped mirror screws with rubber buffers to plugs in brickwork or concrete

1 Mirror size 400 x 600mm high

A 6 B 6

No 12

Carried to Collection

R

Amount

BILL NO. 14
GLAZING
COLLECTION

Page No

Brought Forward from Page

62

63

Carried to Summary

R

Unit Quantity Rate Amount

BILL NO. 15
PAINTWORK

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

Supplementary Preambles

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

Carried to Collection

R

Unit Quantity Rate Amount

General preparation to all surfaces:

All surfaces (interior and exterior) shall be thoroughly cleaned down before decoration to remove all dirt, grease, dust and rust, etc. as applicable by whatever means necessary without damage to surfaces beneath, and in strict accordance with the paint manufacturers instructions to leave same in perfect condition to receive new paintwork.

All surfaces shall be sanded down smooth prior to application of first coat of paint and between succeeding coats.

Spot sheets are to be provided to prevent spotting of all adjacent surfaces.

Finishing coats:

Bidders are to note that where two or more finishing coats are specified, this is the minimum requirement in order to achieve a finished surface of high quality. Should insufficient cover be achieved after said minimum, additional coats are to be applied at no additional cost to the Contract and to the satisfaction of the Principal Agent. Onus therefore rests on the Contractor to ensure that preparatory work is sufficient.

Surfaces to be dry:

All plastered wall and ceiling surfaces shall be perfectly dry prior to application of paint.

PAINTWORK, ETC. TO NEW WORK

ON EXTERNAL FLOATED PLASTER SURFACES

One coat Plascon "UC56" plaster primer or other approved plaster primer and two finishing coats "Plascon Wall&All", Colour: Touchstone, Code: Y2-E1-4 or other approved paint.

1	Walls	m ²	542	
	A 271 B 271			

ON INTERNAL FLOATED PLASTER

One coat 'Plascon UC56' plaster primer or other approved plaster primer and two finishing coats of 'Plascon Wall & All' (Colour: Soap Bubble, Code: Y2-E2-2) or other approved paint.

2	On internal walls	m ²	790	
	A 395 B 395			

Carried to Collection

R

Bill No. 15
Paintwork

		Unit	Quantity	Rate	Amount
	<u>One coat Plascon Merit Universal Undercoat 'UC1' plaster primer or other approved plaster primer and two finishing coats of 'Plascon Kitchen and Bathroom' (Colour: White) or other approved paint.</u>				
3	On internal walls A 77 B 77 <u>ON FIBRE-CEMENT</u> <u>Prime with Plascon UC56 primer or other approved primer paint and two finishing coats 'Plascon Wall & All' Colour: White, or other approved paint, with nailheads painted with galvanised metal primer prior to painting</u>	m ²	154		
4	On ceilings and cornices A 169 B 169 <u>Prime with Plascon UC56 primer or other approved primer paint and two finishing coats 'Plascon Kitchens and Bathrooms' Colour: White, or other approved paint, with nailheads painted with galvanised metal primer prior to painting</u>	m ²	338		
5	On ceilings and cornice A 32 B 32 <u>One coat primer (Plascon UC 56) plaster primer or other approved primer and two coats exterior "Plascon Wall n All", Colour: Hide and Seek, Code: Y2-E1-2, or other approved paint</u>	m ²	64		
6	On fascias and barge boards A 36 B 36 <u>One coat merit plaster primer (Plascon UC56), one universal undercoat (Plascon UC1) and two coats paint (Plascon Velvagio) (colour : to architects' approval), or other approved paint</u>	m ²	72		
7	On sills, etc not exceeding 300mm girth A 18 B 18 <u>ON METAL</u> <u>Sand and Clean down with galvanized iron cleaner (Plascon), rinse and apply one coat galvanised metal primer (Plascon) or other approved and two finishing coats Plascon Velvagio (Colour: Broken white) or other approved paint</u>	m	36		
8	On door frames A 25 B 25	m ²	50		
	Carried to Collection			R	
	Bill No. 15 Paintwork				

Amount

BILL NO. 15
PAINTWORK
COLLECTION

Page No

Brought Forward from Page

65

66

67

68

Carried to Summary

R

NEW 2 X 6 BED STAFF ACCOMMODATION UNITS AT MPILA CAMP IMFOLOZI GAME RESERVE

BUILDING WORKS SUMMARY PAGE

		Page	Amount	
1	EARTHWORKS	4		
2	CONCRETE, FORMWORK and REINFORCEMENT	10		
3	MASONRY	14		
4	WATERPROOFING	17		
5	ROOF COVERINGS	20		
6	CARPENTRY AND JOINERY	27		
7	CEILING, PARTITIONS AND ACCESS FLOORING	30		
8	JOINERY FITTINGS	34		
9	IRONMONGERY	38		
10	METALWORK	44		
11	PLASTERING	48		
12	TILING	52		
13	PLUMBING AND DRAINAGE	61		
14	GLAZING	64		
15	PAINTWORK	69		
	Sub Total (A)		R	
	CARRIED TO FINAL SUMMARY PAGE (FS1)			

**NEW 2 X 6 BED STAFF ACCOMMODATION UNITS
AT MPILA CAMP IMFOLOZI GAME RESERVE**



**PART C3.3:
EXTERNAL WORKS**

Unit Quantity Rate Amount

BILL NO. 16
EXTERNAL WORKS

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

SUPPLEMENTARY PREAMBLES

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

Nature of ground

A soil investigation has NOT been carried out on site.

The nature of the ground is assumed to be loose sandy material, therefore 'earth', but possibly interspersed with 'soft rock' or 'hard rock'.

The tenderer should acquaint himself with the nature of the material to be excavated.

Descriptions

Descriptions of excavations shall be deemed to include all ground conditions classifiable as "earth" described in the above report, and where conditions of a more difficult character are indicated, these are separately measured.

Carried to Collection

R

	Unit	Quantity	Rate	Amount
<u>Bulking</u>				
No allowance has been made for bulking, contractor to allow accordingly. No claims in this regard will be entertained and bidders are therefore to allow accordingly for same in their rates.				
<u>Filling</u>				
Notwithstanding the reference to prescribed multiple handling in clause 1 page 6 of the Standard System of Measuring Building Work, prices for filling and backfilling shall include for all selection and any necessary multiple handling of material that may be required in respect of the founding requirements.				
<u>Testing</u>				
Prices for filling are to include for all necessary density tests in accordance with the relevant sections of SANS.				
<u>Carting away of excavated material</u>				
Descriptions of carting away of excavated material shall be deemed to include loading excavated material onto trucks directly from the excavations or, alternatively, from stock piles situated on the building site.				
All dumping to be done at a registered dump site and way bill certificates provided to the Principal Agent for payment to be made to the Contractor for dumping.				
<u>DEMOLITIONS</u>				
<u>Carefully demolish and remove:</u>				
1				
Single storey simple structure with verandah attachment approximately 6500mm x 4500mm x 3600mm high, constructed of brick walls, concrete surface bed, corrugated roof sheets (Verandah) on timber roof structure and roof tiles (Main Building) on timber roof trusses, including metal windows, timber doors and frames, plumbing and drainage related items, ceiling, wall tiles etc. and breaking up and removing foundations and foundation brickwork, filling with approved material obtained from the excavations and compacting to 98% Mod AASHTO density complete.				
	No	1		
Ewrk 1				
2				
Removal of existing half brick wall rondavel's size 3600mm diameter x 4500mm high overall, comprising of thatch roof coverings and breaking up and removing foundations and foundation brickwork, filling with approved material obtained from the excavations and compacting to 98% Mod AASHTO density complete.				
	No	1		
Ewrk 1				
Carried to Collection			R	
Bill No. 16				
External Works				

	Unit	Quantity	Rate	Amount
3 Removal of existing half brick wall rondavel's size 3200mm diameter x 4500mm high overall, comprising thatch roof coverings and breaking up and removing foundations and foundation brickwork, filling with approved material obtained from the excavations and compacting to 98% Mod AASHTO density complete. Ewrk 11	No	11		
4 Removal of existing carport structure approximately 8000mm x 5500mm x 2700mm high, comprising of gumpoles, timber rafters and corrugated roof sheets and breaking up and removing foundations, filling with approved material obtained from the excavations and compacting to 98% Mod AASHTO density complete. Ewrk 44	m ²	44		
5 Removal of existing gumpoles not exceeding 600mm high Ewrk 3	No	3		
<u>Carefully remove and relocate</u>				
6 Carefully remove prefabricated parkhomes approximately 10000mm x 3500mm x 3050mm high, and relocate within 5km of the reserve Ewrk 1	No	1		
7 Carefully dismantle and remove galvanised mild steel gates approximately 4200mm x 1200mm high Ewrk 1	No	1		
8 Clean out existing septic tank and French Drain approx. 4000mm x 2500mm. Break up bottom of tank, back fill with rubble from demolished buildings and make good. Ewrk 1	No	1		
9 Removal of washing line approximately 15600mm x 1800mm high, comprising of gumpoles and three sets of galvanised mild steel wire Ewrk 2	No	2		
10 Allow an amount for proving and relocation of existing services Ewrk 1	Item			
11 Budgetary allowance for the sum of R 100,000.00 (One Hundred Thousand Rand Only) for the removal and relocation of any unforeseen alteration works Ewrk 1	Item			
Carried to Collection			R	
Bill No. 16 External Works				

		Unit	Quantity	Rate	Amount
<u>SITE CLEARANCE, ETC.</u>					
<u>Site clearance</u>					
12	Digging up and removing rubbish, debris, vegetation, hedges, shrubs and trees not exceeding 200mm girth, bush, etc. Ewrk 2000	m ²	2 000		
13	Stripping average 150mm thick layer of top soil and stockpiling on site. Ewrk 321	m ²	321		
<u>REMOVAL OF TREES, ETC.</u>					
<u>Taking out and removing, grubbing up roots and filling in holes</u>					
14	Tree stump exceeding 200mm and not exceeding 500mm girth. Ewrk 2	No	2		
15	Tree stump exceeding 500mm and not exceeding 1000mm girth. Ewrk 1	No	1		
16	Tree stump exceeding 1000mm and not exceeding 1500mm girth. A 1	No	1		
17	Provide temporary screen/s to prevent entry to the works by staff members, formed of gumpole fence and dust screen. Dust screen approximately 1.5 - 2m high, formed of approved timber framing with 250 micron polyethylene sheeting stapled or nailed on, including corners, ends, bracing, etc. (Labour Intensive) Ewrk 169	m	169		
18	Allow for watering the works with jet or spray sufficiently to prevent any nuisance from dust during the alterations or demolitions. Ewrk 1	Item			
19	Allow for the removal of existing rubble and waste, etc. From the site before commencement of the works. Ewrk 1	Item			
Carried to Collection				R	
Bill No. 16 External Works					

Unit Quantity Rate Amount

LEVELLING OF SITE

Note : After site clearance has been completed the Contractor will roughly level the site to be built upon. The Contractor will be responsible to draw up a grid of levels at suitable centres to indicate which areas have to be filled and which areas have to be cut. In the event of any discrepancies, between levels taken by the Contractor, the Contractor will immediately notify the Engineer of such discrepancies, prior to the commencement of the works in order to clarify the matter. In the event of the Contractor accepting levels indicated on the engineers drawings he shall notify the Engineer in writing prior to the work put in hand.

Quantities of all excavation and filling measured in this Bill is measured nett. Prices must include for bulking.

BULK EARTHWORKS

Note : Sandy clay , weathered residual dolomite, etc. Which can be broken up or removed by means of a heavy duty caterpillar complete with all equipment and accessories and in good condition, producing not less than 224 kW at the flywheel and a bare tractor weight of not less than 24500 kg, equipped with a matching parallelogram type ripper using a single tine only, will be classified as "earth". All chert boulders of not exceeding 1,00m diameter will also be classified as "earth".

Very hard dolomite, etc. The removal of which necessitates the use of explosives as well as all chert boulders of exceeding 1,00m diameter will be classified as "hard rock".

Prices for open face excavation shall include for the formation of battered banks as required for lateral support and for ramps for the removal of excavated material and shall also include for the "directed" or "required". Battered banks required to be excavated out in slots and short lengths for lateral support purposes have been measured as "extra over excavation".

Earthworks

Earthworks are to be executed in accordance with SABS 1200 D.A. 1979 "Earthworks (Small Works)" . Consolidations is to be done at optimum moisture content.

20 Excavate to reduce levels in open face 2,0m deep extreme and deposit in areas of fill and compact in 150mm layers to 95% Mod AASHTO density.

m³ 986

Ewrk 986

Carried to Collection

R

Bill No. 16
External Works

	Unit	Quantity	Rate	Amount
<u>Extra over bulk excavation in pickable material for basements, reduced levels, etc. For excavation, in :</u>				
21	Soft rock	m ³	99	
	Ewrk 99			
22	Hard rock	m ³	49	
	Ewrk 49			
23	Breaking up existing mass concrete or brickwork (Provisional)	m ³	1	
	Ewrk 1			
<u>Carting</u>				
All dumping to be done in a registered dump site and way bill certificates provided to the Principal Agent for payment to be made to the Contractor for dumping.				
24	Carting away surplus excavated material from spoil heaps and deposit at a dumping site beyond the site boundaries to be found by the Contractor.	m ³	962	
	Ewrk 962			
<u>Sundries</u>				
25	Allow for the removal of existing drains, pipes, etc. encountered in the excavations, including stopping off as required and filling in solid where necessary.	Item		
	Ewrk 1			
26	Allow for keeping bulk excavations free from water and mud.	Item		
	Ewrk 1			
<u>Filling</u>				
<u>Filling obtained from the excavations well watered and consolidated in layers exceeding 300mm not exceeding 450mm thick to obtain 95% modified AASHTO dry density, in</u>				
27	Building platforms	m ³	24	
	Ewrk 24			
<u>Compaction</u>				
<u>Surface Preparation</u>				
28	Rip and scarify surface of reduced level excavations to a depth of 150mm, grade to levels and falls and compact to 95% modified AASHTO dry density.	m ²	1 089	
	Ewrk 1089			
Carried to Collection			R	
Bill No. 16 External Works				

		Unit	Quantity	Rate	Amount
<u>BRICK WALLS,RETAINING WALLS, RAMPS AND STAIRS</u>					
<u>RETAINING WALL</u>					
<u>Earthworks</u>					
<u>Open face excavation in earth</u>					
29	To embankment behind retaining blocks including trimming to slope Ewrk 214	m ³	214		
<u>Excavation in earth not exceeding 2m deep</u>					
30	Trenches Ewrk 31	m ³	31		
<u>Extra over trench and hole excavations in earth for excavation in</u>					
31	Soft rock Ewrk 25	m ³	25		
32	Hard rock Ewrk 12	m ³	12		
33	Class B boulders containing 40% or less by volume of boulders of size exceeding 0.03m ³ and not exceeding 20m ³ Ewrk 25	m ³	25		
34	Class A boulders containing more than 40% by volume of boulders of size exceeding 0.03m ³ and not exceeding 20m ³ Ewrk 12	m ³	12		
<u>Risk of collapse of excavations</u>					
35	Sides of trench and hole excavations not exceeding 1,5m deep Ewrk 89	m ²	89		
<u>Keeping excavations free of water</u>					
36	Keeping excavations free of water Ewrk 1	Item			
<u>Filling</u>					
<u>Coarse clean riversand drainage blanket compacted in layers Not Exceeding 300mm and compacted to 93% Mod AASHTO</u>					
37	Behind Retaining walls Ewrk 68	m ³	68		
Carried to Collection				R	
Bill No. 16 External Works					

		Unit	Quantity	Rate	Amount
<u>Plumbing and Drainage</u>					
<u>Subsoil Drainage</u>					
46	100mm Diameter "Cordrain" or other approved agricultural pipes laid in trenches (Measured elsewhere), to 1:100, Not Exceeding 2m Deep including 19mm crushed stone encasing size 300 x 300mm "Bidum U14" or other approved drainage grade geotextile around encasing with 150mm side and 300mm end laps including stitching.	m	99		
	Ewrk 99				
<u>THE FOLLOWING IN 2 No NEW WATER TANKS AND PLINTHS TO WATER STORAGE TANKS</u>					
<u>Earthworks</u>					
47	Excavation in earth not exceeding 2m deep for trenches	m ³	96		
	Ewrk 96				
48	Risk of collapse to sides of trenches and hole excavations not exceeding 2m deep	m ²	62		
	Ewrk 62				
49	Earth filling of G5 material in accordance with the relevant part of SANS 10400, compacted to 98% MOD AASHTO density in trenches and under surface beds	m ³	50		
	Ewrk 50				
50	Earthfilling obtained from the excavations and/or prescribed stockpiles on site, compacted to 95% Mod AASHTO density.	m ³	8		
	Ewrk 8				
<u>Compaction of surfaces, including scarifying for a depth of 150mm, breaking down oversize material where necessary and compacting to 95% Mod AASHTO density</u>					
51	Ground surface under floors, etc.	m ²	88		
	Ewrk 88				
<u>Compaction of G5 material in 150mm layers and compacted to 98% MOD AASHTO</u>					
52	Ground surface, under floors, etc.	m ²	88		
	Ewrk 88				
<u>Soil Poisoning Certificate</u>					
53	Issue of Soil Poisoning Certificate by registered and authorised entity.	Item			
	Ewrk 1				
Carried to Collection				R	
Bill No. 16					
External Works					

		Unit	Quantity	Rate	Amount
54	Approved brand of anti-termite soil poison applied by a registered pest control company and guaranteed against termite infestation for 10 years under floors, steps, paving, etc.	m ²	88		
	Ewrk 88				
55	Ditto but to bottoms and sides of trenches	m ²	30		
	Ewrk 30				
56	Extra over all excavation for loading, carting and dumping surplus excavated material (no allowance made for increase in bulk) off site to a dump site to be located by the contractor	m ³	88		
	Ewrk 88				
	<u>Concrete, Formwork and Reinforcement</u>				
57	15 Mpa unreinforced concrete in blinding	m ³	1		
	Ewrk 1				
58	25 Mpa/19mm reinforced concrete in base	m ³	11		
	Ewrk 11				
59	30 Mpa/19mm reinforced concrete in slab	m ³	3		
	Ewrk 3				
60	Rough formwork (Degree of accuracy III) in narrow widths exceeding 300mm wide to sides of surface beds	m ²	11		
	Ewrk 11				
61	Smooth formwork (Degree of accuracy III) in narrow widths not exceeding 300mm wide to sides of slabs	m	24		
	Ewrk 24				
62	Finishing top surface of concrete smooth with a wood float	m ²	18		
	Ewrk 18				
63	12mm Slip joints not exceeding 300mm wide between horizontal concrete and brick surfaces including cement mortar bed and one layer 250 micron waterproofing sheeting	m	24		
	Ewrk 24				
64	Ref 395 Mesh reinforcement to surface beds	m ²	18		
	Ewrk 18				
	<u>Mild tensile steel reinforcement</u>				
65	Various diameter bars	Tonnes	0.06		
	Ewrk 0.06				
	<u>High tensile steel reinforcement</u>				
66	Various diameter bars	Tonnes	0.64		
	Ewrk 0.64				
	Carried to Collection			R	
	Bill No. 16				
	External Works				

		Unit	Quantity	Rate	Amount
<u>Masonry</u>					
67	Brickwork in foundations of NFX bricks (14MPa Nominal Compressive Strength) in class I mortar in One brick walls Ewrk 6	m ²	6		
68	Brickwork in super structure of NFP bricks (14MPa Nominal Compressive Strength) in class I mortar in One brick walls Ewrk 10	m ²	10		
69	Extra over brickwork for face brickwork for foundations in "Corobrik Firelight Satin FBX" face bricks, with recessed vertical and horizontal jointing Ewrk 6	m ²	6		
70	Extra over brickwork for face brickwork for super structure in "Corobrik Firelight Satin FBX" face bricks, with recessed vertical and horizontal jointing Ewrk 10	m ²	10		
71	150mm Wide brickwork reinforcement built in horizontally Ewrk 171	m	171		
<u>Waterproofing</u>					
72	One layer of 250 micron waterproof sheeting under surface beds Ewrk 43	m ²	43		
<u>Tanks, etc</u>					
73	Extra over 25mm Polypropylene pipes for fitting Ewrk 30	No	30		
74	25mm polypropylene pipes Ewrk 60	m	60		
75	20mm diameter PVC ball valve with an including reducing bushes fixed with 90 degree PVC screw elbow, fitting into and including a 22mm extension pipe approximately 250mm long including barrel, nipple and socket and 3mm galvanised steel plate support, with 1 No. 23mm diameter hole at top for pipe inlet and 2no 18mm diameter holes at bottom for and including 2 No. M18 x 15mm rawl bolts cast into concrete plinths (Concrete plinth elsewhere measured) Ewrk 2	No	2		
Carried to Collection				R	
Bill No. 16					
External Works					

		Unit	Quantity	Rate	Amount
76	PVC Rainwater harvesting 10 000 litre water tank, complete with vermin proof lid, inlets, outlets, etc. and anchored down with and including 4mm diameter galvanised mild steel wire loop double and fixed to top of tank with 15mm diameter rubber hose as sleeve, and anchored to top of concrete plinth with and including 4 No. Y10 high tensile steel reinforcement rods cast into concrete plinth Ewrk 2 Water storage tanks shall carry a minimum 8 year manufacturer guarantee, which certificate shall be handed over to the Client upon practical completion	No	2		
	<u>CONCRETE STORMWATER (SURFACE) CHANNELS</u> <u>25MPa/19mm Concrete</u> <u>In-situ concrete channels, including excavation for channel and 100mm deep layer imported G5 gravel filling compacted to 93% Mod AASHTO, ref 193 mesh, finishing of concrete with a smooth wood float,etc. and all formwork and sealing of joints at 2m centres</u>				
77	1000 x 100mm Channels cast in panels, with 100mm deep concrete V-channel Ewrk 137	m	137		
78	500 x 100mm Channels cast in panels, with 50mm deep concrete V-channel Ewrk 99	m	99		
79	Extra over 1000mm channel for angles, intersections, ends, dressing into sides of catchpits, etc. Ewrk 8	No	8		
80	Extra over 500mm channel for angles, intersections, ends, dressing into sides of catchpits, etc. Ewrk 8	No	8		
81	Spreader or V-drain outlet of reinforced concrete (25mPa) floor, toe and sides (channel 1000mm wide with trapesuim shaped floor size 1500mm long x 1500mm wide at open end with 100 x 150mm toe to end of spreader, with concrete bricks planted in to form water-break (100mm protruding from concrete), including excavation, 100mm thick imported G5 gravel filling, compaction to 95% Mod AASHTO under spreader, concrete, formwork, etc. (refer Engineers' Drawing) Ewrk 2	No	2		
	Carried to Collection				R
	Bill No. 16 External Works				

	Unit	Quantity	Rate	Amount
HEADWALLS				
Excavation in earth not exceeding 2m deep:				
82	Holes	m ³	1	
	Ewrk 1			
Extra over all excavations for carting away:				
83	Surplus material from excavations and/or stockpiles on site, to a dumping site to be located by the Contractor.	m ³	1	
	Ewrk 1			
Risk of collapse of excavations:				
84	Sides of trench and hole excavations not exceeding 1.5m deep.	m ²	1	
	Ewrk 1			
Compaction of surfaces:				
85	Compaction of ground surface under floors etc including scarifying for a depth of 150mm, breaking down oversize material, adding suitable material where necessary and compacting to 95% Mod AASHTO density.	m ²	5	
	Ewrk 5			
Stone pitching tightly packed and grouted with 1:5 cement sand mortar with and including preparation of ground surfaces under:				
86	Against cut-off walls.	m ³	2	
	Ewrk 2			
Soil insecticide in accordance with SANS 5859:				
87	Under floors etc including forming and poisoning shallow furrows against foundation walls etc, filling in furrows and ramming.	m ²	5	
	Ewrk 5			
88	To bottoms and sides of trenches, etc.	m ²	1	
	Ewrk 1			
20Mpa/19mm concrete:				
89	Blinding	m ³	1	
	Ewrk 1			
90	Strip footings.	m ³	1	
	Ewrk 1			
Rough formwork to sides:				
91	Sides of strip footings not exceeding 300mm high.	m	1	
	Ewrk 1			
	Carried to Collection			R
Bill No. 16				
External Works				

Unit Quantity Rate Amount

Fabric reinforcement:

92 Type 193 fabric reinforcement in concrete surface beds etc.

m² 1

Ewrk 1

Carried to Collection

R

Amount

BILL NO. 16
EXTERNAL WORKS
COLLECTION

Page No

Brought Forward from Page

70

71

72

73

74

75

76

77

78

79

80

81

82

83

Carried to Summary

R

Unit Quantity Rate Amount

BILL NO. 17
CIVIL PLUMBING AND DRAINAGE (PROVISIONAL)

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

SUPPLEMENTARY PREAMBLES

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

CERTIFICATE OF COMPLIANCE

All civil plumbing and drainage works carried out on site should be done by a registered plumber and the necessary certificates of compliance for civil plumbing and drainage works should be forwarded to the Principal Agent/ Client on completion.

Carried to Collection

R

Bill No. 17
 Civil Plumbing And Drainage (provisional)

Unit	Quantity	Rate	Amount
------	----------	------	--------

uPVC pipes and fittings

Soil, waste and vent pipes and fittings shall be solvent weld jointed.

Pipes for water supply shall be of the class stated

Pipes of 40mm diameter and smaller shall be plain ended with solvent welded uPVC loose sockets and fittings.

Pipes of 50mm diameter and greater shall have sockets and spigots with push in type integral rubber ring joints. Bends shall be uPVC and all other fittings shall be cast iron, all with similar push-in type joints.

Copper pipes

Pipes shall be hard drawn and half-hard pipes of the class stated. Class 0 (thin walled hard drawn) pipes shall not be bent. Class 1 (thin walled half-hard), Class 2 (half-hard) and Class 3 (heavy walled half-hard) pipes shall only be bent with benders with inner and outer formers. Fittings to copper waste, vent and anti-syphon pipes, capillary solder fittings and compression fittings shall be "Cobra Watertech" type. Capillary solder fittings shall comply with ISO 2016. Only compression fittings shall be used in walls or in ground.

Fixing of pipes

Unless specifically otherwise stated, descriptions of pipes shall be deemed to include fixing to walls, etc, casting in, building in or suspending not exceeding 1m below suspension level.

Brick inspection chambers, catchpits, etc.

Descriptions of brick inspection chambers, catchpits, etc. Shall be deemed to include excavations, concrete base/s, concrete coverslabs, brickwork, finishes internally and externally, channels, channel bends, channel junctions, concrete benching and step irons (where required), jointing to drains and backfilling, compaction, etc.

Septic - and Conservancy tanks, etc.

Descriptions of septic tanks shall be deemed to include excavations, bedding and jointing, concrete base slabs, jointing to drains and backfilling, compaction, etc. All in accordance with the manufacturers instructions.

Exposed concrete surfaces

Exposed surfaces of concrete stormwater channels, cover slabs, inspection eye marker slabs, gully tops, cleaning eye tops, catchpits, inspection chambers, etc. Shall be finished smooth with plaster.

Carried to Collection

R

Bill No. 17

Civil Plumbing And Drainage (provisional)

Unit Quantity Rate Amount

Excavations

No claim for rock excavation will be entertained unless the contractor has timeously notified the quantity surveyor thereof prior to backfilling.

"Soft rock" and "hard rock", etc. Shall be as defined in "Earthworks"

Laying, backfilling, bedding, etc. of pipes

Pipes shall be laid and bedded and trenches shall be carefully backfilled in accordance with the manufacturers' instructions.

Backfill Class 1

The backfill material must be homogeneous and must be compacted to 90% Mod AASHTO density in layers not exceeding 100mm.

The following may be present :

- a. Tree roots, building rubble and/or organic matter.
- b. Lumps of clay exceeding 75mm.
- c. Stones exceeding 20mm.

Backfill Class 2

Selected backfilling material with CBR> 7at 95% Mod AASHTO density with a maximum PI not exceeding 12 and maximum layer thickness of 100mm.

Backfill Class 3

Backfill from trench excavations compacted to 90% Mod AASHTO density.

Laying of pipes

Pipes shall be laid in accordance with clauses 5.1 and 5.2 of each of the following :

SABS 1200 L : Medium-pressure pipelines

SABS 1200 LD : Sewers

SABS 1200 LE : Stormwater drainage

SABS 1200 DB : Earthworks (Pipe trenches)

SABS 1200 LB : Bedding (Pipes)

Pipes shall be bedded in accordance with clauses 3.1 to 3.4.1, 5.1 to 5.3 and 7 of SABS 1200

Unless otherwise described bedding of rigid pipes shall be class B bedding.

Carried to Collection

R

Bill No. 17

Civil Plumbing And Drainage (provisional)

	Unit	Quantity	Rate	Amount
Pipe trenches, etc. Shall be backfilled in accordance with clauses 3, 5.5, 5.6, 5.7 and 7 of SABS 1200				
<u>STORMWATER DRAINAGE</u>				
<u>Upvc Pipes</u>				
<u>200mm diameter pipes</u>				
1	In trenches not exceeding 1m deep.	m	11	
	Ewrk 11			
2	In trenches exceeding 1m and not exceeding 2m deep.	m	116	
	Ewrk 116			
<u>MANHOLES</u>				
<u>Sumps, catchpits, inspection chambers, etc. including concrete kerbs or precast concrete cover slabs</u>				
3	Excavate and build 1000 x 1000mm manhole exceeding 750mm not exceeding 1000mm deep internally with and including 85mm thick unreinforced concrete reducer slab, one brickwall construction with inner face of brick walls bagged in 1: 4 cement mortar, 600 x 600mm cast iron double seal cover and frame, 250mm thick x 1000mm x 1000mm reinforced 25MPa/19mm concrete base with and including ref 193 mesh, 15MPa/19mm concrete benching and including all necessary risk of collapse, backfilling, compaction, etc. On completion all as per drawing: 033-CI-001-001-0.1 appended at the back of these Bills of Quantities.	No	4	
	Ewrk 4			
4	Excavate and build 1000 x 1000mm manhole exceeding 1000mm not exceeding 1250mm deep internally with and including, one brickwall construction with inner face of brick walls bagged in 1: 4 cement mortar, 1220mm x 1220mm precast concrete cover and frame, 250mm thick x 1000mm x 1000mm reinforced 25MPa/19mm concrete base with and including ref 193 mesh, 15MPa/19mm concrete benching and including all necessary risk of collapse, backfilling, compaction, etc. On completion all as per drawing: 033-CI-001-001-0.1 appended at the back of these Bills of Quantities.	No	3	
	Ewrk 3			
Carried to Collection				
			R	
Bill No. 17				
Civil Plumbing And Drainage (provisional)				

		Unit	Quantity	Rate	Amount
5	Excavate and build 1000 x 1000mm manhole exceeding 1250mm not exceeding 2000mm deep internally with and including, one brickwall construction with inner face of brick walls bagged in 1: 4 cement mortar, 1220mm x 1220mm precast concrete cover and frame, 250mm thick x 1000mm x 1000mm reinforced 25MPa/19mm concrete base with and including ref 193 mesh, 15MPa/19mm concrete benching and including all necessary risk of collapse, backfilling, compaction, etc. On completion all as per drawing: 033-CI-001-001-0.1 appended at the back of these Bills of Quantities. Ewrk 1 <u>STONE PITCHING</u> <u>Stone pitching of approximately 100mm diameter river stones tightly packed including preparation of ground surface under</u>	No	1		
6	100mm Thick against sloping banks bedded and jointed in 1:8 cement mortar and pointed with hollow recessed joints. Ewrk 5 <u>SEWER PIPES, ETC.</u>	m ²	5		
7	110mm Pipes vertically or ramped to cleaning eyes, etc. (no excavation) Ewrk 17	m	17		
8	110mm Pipes laid in and including trenches not exceeding 1.00m deep Ewrk 28	m	28		
9	110mm Pipes laid in and including trenches exceeding 1.00m and not exceeding 2.00m deep Ewrk 46	m	46		
10	110mm Pipes laid in and including trenches exceeding 2.00m and not exceeding 3.00m deep Ewrk 40 <u>Extra over uPVC pipes for fittings</u>	m	40		
11	110mm Bend Ewrk 20	No	20		
12	110mm Junction Ewrk 10	No	10		
13	110mm Inspection eye bend Ewrk 10	No	10		
14	110mm Inspection eye junction Ewrk 20	No	20		
15	110mm Rodding eye Ewrk 24	No	24		
Carried to Collection				R	
Bill No. 17 Civil Plumbing And Drainage (provisional)					

	Unit	Quantity	Rate	Amount
<p><u>INSPECTION CHAMBERS, CATCHPITS, SUMPS, ETC.</u> <u>(Gratings and covers elsewhere)</u> <u>Supplementary specification</u> The following shall apply to all inspection chambers, catchpits, sumps, junction boxes, etc. as measured hereunder.</p>				
<p>1. <u>Bottoms</u> :</p> <p>100mm Thick concrete (20mPa/19mm stone), all benched up (to approximately 250mm) to self-cleansing falls. The bottom section of the chamber is set into freshly cast concrete base into which sewer pipes/channels have been laid.</p>				
<p>2. <u>Walls/sides</u> :</p> <p>Pre-fabricated reinforced concrete chamber rings (300, 400, 600 or 1200) to receive cover slab. Factory fabricated manhole rings must comply with SABS 1294-1981.</p> <p>Joints between rings to be sealed with ABE "Bitu-joint" putty, and the outside wrapped with tape.</p>				
<p>3. <u>Cover/Tops</u> :</p> <p>175mm Thick reinforced concrete cover slabs, including concrete surround with 2 x R8 reinforcing steel stirrupsnto receive frame. (elsewhere measured)</p>				
<p>4. <u>Finishes</u> :</p> <p>All exposed surfaces finished smooth with plaster (1:3).</p> <p>The cover of the inspection chamber, catchpit, etc. To be 150mm proud of natural ground level or flush with adjacent paving.</p>				
16	No	2		
<p>Inspection chamber 1000mm diameter exceeding 750mm not exceeding 1000mm deep internally</p> <p>Ewrk 2</p>				
17	No	1		
<p>Inspection chamber 1000mm diameter exceeding 1000mm not exceeding 2000mm deep internally</p> <p>Ewrk 1</p>				
<p><u>DRAINS, CONSERVANCY TANKS, ETC.</u> <u>Drain pipes, etc.</u> <u>uPVC pipes</u></p>				
18	m	6		
<p>100mm Geopipe perforated pipe laid in drains (drains elsewhere measured)</p> <p>Ewrk 6</p>				
			R	
Carried to Collection				
<p>Bill No. 17 Civil Plumbing And Drainage (provisional)</p>				

		Unit	Quantity	Rate	Amount
	<u>Extra over uPVC pipes for fittings</u>				
19	110mm End cap Ewrk 1	No	1		
20	110mm Bend Ewrk 2	No	2		
	<u>French drains</u>				
	Note : Refer Engineers' Drawings for details.				
21	1350 x 860 x 410mm high "Kaytech Infiltrator Chamber" (based percolation = 30mm diameter and 200l/day consumption per room) french drain installed complete, as per manufacturers instructions to attached engineers drawing: 033-CI-003-001-0.2/033-CI-001-001-0.1 appended at the back of these Bills of Quantities. Ewrk 72	No	72		
22	480 x 860 x 410mm high "Kaytech Infiltrator Chamber" End cap, as per manufacturers instructions to attached engineers drawing 033-CI-003-001-0.2/033- CI-001-001-0.1, appended at the back of these Bills of Quantities. Ewrk 12	No	12		
	<u>Conservancy and Septic Tanks</u>				
	Note : Refer Engineers' Drawings for details.				
23	5400 Litre "Calcamite" conservancy tank, laid underground according to manufacturers specifications, including all necessary excavations, backfilling, etc. All to attached engineers drawing: 033-CI-003-001-0.2, appended at the back of these Bills of Quantities. Ewrk 1	No	1		
	<u>SUNDRIES</u>				
24	150 x 150 x 150mm Precast concrete inspection eye marker slab set in ground. Ewrk 20	No	20		
25	100mm PVC "ABC" cleaning eye (fixed with counter- sunk allen-key bolts for maximum protection). Ewrk 2	No	2		
	<u>WATER SUPPLIES</u>				
	<u>WATER PIPES, ETC.</u>				
	<u>Copper pipes (class 460/2) laid in and including trenches</u>				
26	22mm Pipes Ewrk 4	m	4		
	Carried to Collection				R
	Bill No. 17 Civil Plumbing And Drainage (provisional)				

		Unit	Quantity	Rate	Amount
	<u>Copper pipes (class 460/3)</u>				
27	22mm Pipes vertical in ground (no excavation) Ewrk 4	m	4		
	<u>Extra over copper pipes (class 460/2) for brass compression fittings</u>				
28	22mm Fittings Ewrk 3	No	3		
29	22mm Copper to steel fittings Ewrk 3	No	3		
	<u>HDPE pressure pipes (class 9) laid in and including trenches</u>				
30	35mm Pipes Ewrk 36	m	36		
31	50mm Pipes Ewrk 200	m	200		
	<u>Extra over HDPE pipes for HDPE pressure fittings</u>				
32	35mm Reducer Ewrk 3	No	3		
33	50mm Reducer Ewrk 35	No	35		
34	35mm Elbow Ewrk 3	No	3		
35	50mm Elbow Ewrk 33	No	33		
36	35mm Tee Ewrk 3	No	3		
37	50mm Tee Ewrk 33	No	33		
	<u>TAPS, VALVES, ETC.</u>				
	<u>Brass</u>				
38	22mm Gate valve (SABS 776) Ewrk 1	No	1		
	<u>WATER SUPPLIES to FIRE APPLIANCES, ETC.</u>				
	<u>HDPE pressure pipes (class 16)</u>				
39	35mm Pipes laid in and including trenches Ewrk 68	m	68		
	<u>Extra over HDPE pipes for HDPE pressure fittings</u>				
40	38mm Elbow Ewrk 4	No	4		
	Carried to Collection			R	
	Bill No. 17 Civil Plumbing And Drainage (provisional)				

Amount

BILL NO. 17

CIVIL PLUMBING AND DRAINAGE (PROVISIONAL)

COLLECTION

Page No

Brought Forward from Page

85

86

87

88

89

90

91

92

93

Carried to Summary

R

NEW 2 X 6 BED STAFF ACCOMMODATION UNITS AT MPILA CAMP IMFOLOZI GAME RESERVE

EXTERNAL WORKS SUMMARY PAGE

		Page	Amount
16	EXTERNAL WORKS	84	
17	CIVIL PLUMBING AND DRAINAGE (PROVISIONAL)	94	
Sub Total			R
CARRIED TO FINAL SUMMARY PAGE (FS1)			

**NEW 2 X 6 BED STAFF ACCOMMODATION UNITS
AT MPILA CAMP IMFOLOZI GAME RESERVE**



**PART C3.4:
ELECTRICAL WORKS**

Unit Quantity Rate Amount

BILL NO. 18
ELECTRICAL WORK

The bidder is referred to the relevant clauses in the ASAQS General Preambles for Trades 2017, to the Standard Preambles, SP1-SP74, to the Supplementary Preambles SUP1-SUP5, to the Architectural and Engineering specifications documents, to the drawings and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Supplementary Preambles

Drawings:

Bidders are to note that where descriptions include reference to drawings, notwithstanding anything contained in the descriptions, bidders are to price these items in accordance with the drawings. Further, the onus is on the tenderer to ensure that all relevant drawings referenced in the Bills of Quantities are included in the tender documents. No additional time and/or monetary claims resulting from non-adherence to the above will be entertained.

CABLES

Supply and Install 600/1000 V grade PVC/SWA/PVC Stranded copper cables complete with all accessories, laid in open trench, drawn in sleeve and pole. Cable termination to include glands, shrouds, lugs, connections and commissioning. Lengths given shall be taken as measured lengths of cable runs from terminal to terminal and rates quoted shall include for off-cuts and wastage.

35 sq mm 4C PVC/SWA/PVC/ECC

1	Supply			m	150		
	A	75	B	75			
2	Install			m	150		
	A	75	B	75			
3	Termination			No	2		
	A	1	B	1			

Carried to Collection

R

Bill No. 18
 Electrical Work

		Unit	Quantity	Rate	Amount
<u>16 sq mm 4-C PVC/SWA/PVC/ECC</u>					
4	Supply	m	100		
	A 50 B 50				
5	Install	m	100		
	A 50 B 50				
6	Termination	No	6		
	A 3 B 3				
<u>POWER and LIGHTING INSTALLATION</u>					
Tenderers are referred to the project specifications for full descriptions of materials, etc to be used. All work shall be done in accordance with specifications and manufacturer's instructions and leave in perfect working order after completion.					
<u>CABLE EXCAVATIONS</u>					
<u>Excavate for cables including temporary support of sides, keeping excavation dry, bedding material, backfilling, compacting and testing as specified. All backfill material to be suitable as per SANS codes and engineers approval. Backfill material to be imported if necessary.</u>					
7	In soft or pickable soil (60%)	m ³	130		
	A 65 B 65				
8	In soft rock (20%).	m ³	44		
	A 22 B 22				
9	In hard rock (20%).	m ³	44		
	A 22 B 22				
<u>DISTRIBUTION BOARDS</u>					
<u>Supply and Install distribution boards and Kiosks as per SLD and specification</u>					
10	Main distribution kiosk complete with lockable door - outdoor IP65 rated complete as per schematic - wall mounted.	No	1		
	A 1				
11	Main Distribution board (EDB) for 6 bed living unit complete with front cover and lockable door built into wall at position indicated 1600mm above floor level as per schematic	No	2		
	A 1 B 1				
12	Unit Distribution board (IDB) complete as CBI Samite or other approved with metal tray and white front cover built into wall at position indicated 1600mm above floor level	No	12		
	A 6 B 6				
Carried to Collection				R	
Bill No. 18 Electrical Work					

		Unit	Quantity	Rate	Amount
13	Supply and Install 100A 3 Pole Circuit Breaker in Existing DB A 1	No	1		
	<u>SLEEVES</u> <u>Supply and Install PVC sleeves for supply to Distribution Board and Gas Installation</u>				
14	50mm Sleeve in ground / concrete slab / brickwork. All gas piping sleeves to be installed with galvanised draw wire. A 660 B 660	m	1 320		
15	50mm bends A 40 B 40	No	80		
	<u>POWER RETICULATION</u> <u>PVC RIGID CONDUIT and FITTINGS</u> <u>Supply and install Rigid PVC conduit, including bends, draw boxes with covers, etc. , fixed or chased in walls</u>				
16	20mm Diameter A 75 B 75	m	150		
	<u>Rigid PVC conduit, including bends, draw boxes with covers, etc. , fixed in concrete surface beds</u>				
17	20mm Diameter A 100 B 100	m	200		
	<u>Rigid PVC conduit, including bends, draw boxes with covers, saddles etc. , fixed in roof spaces</u>				
18	20mm Diameter A 75 B 75	m	150		
	<u>METAL CONDUIT OUTLET BOXES</u> <u>Supply and Install Galvanised steel 100 x100 outlet box and screws to suit any number, size or type of entries fixed onto conduit</u>				
19	100 x 100 x 50mm Deep box A 18 B 18	No	36		
20	50 x 100 x 50mm Deep box A 12 B 12	No	24		
	<u>PVC CONDUIT OUTLET BOXES</u> <u>PVC fixed onto conduits for light fittings</u>				
21	Round conduit box for 20mm diameter conduit complete with covers A 25 B 25	No	50		
	Carried to Collection			R	
	Bill No. 18 Electrical Work				

		Unit	Quantity	Rate	Amount
<u>CONDUCTORS</u>					
<u>Supply and Install PVC insulated stranded copper conductors drawn into conduit, including terminations and connections</u>					
22	1,5mm ² Conductor	m	600		
	A 300 B 300				
23	2,5mm ² Conductor	m	600		
	A 300 B 300				
24	6,0mm ² Conductor	m	800		
	A 400 B 400				
<u>SWITCHES AND SOCKET OUTLETS</u>					
<u>Supply and Install Switched socket isolator outlets, etc., complete with metal cover plate fixed in flush box</u>					
25	16A Three pin double switched socket outlet wall mounted. 1 x 16Amp RSA + 2 x ZA switched outlets. White 100 x100	No	24		
	A 12 B 12				
26	30A Double pole Surface mounted isolator in Ceiling void (for electric geyser)	No	6		
	A 3 B 3				
<u>Light switch flush mounted in walls</u>					
27	16A Single-lever one-way switch	No	24		
	A 12 B 12				
28	16A Flush two-lever one-way switch	No	12		
	A 6 B 6				
<u>LUMINAIRES</u>					
<u>Supply and Install Luminaires complete as specified and indicated in schedule of luminaires supplied and fitted as described to structure or ceilings, including lamps, tubes, connections, brackets, etc.</u>					
29	Surface mounted ceiling luminaire, with die cast aluminium housing and matt acrylic diffuser. CFL lamp (approx 1x15w). To include lamps and all necessary mounting accessories. Minimum IP 44. Insect proof. (C1)	No	12		
	A 6 B 6				
30	Surface mounted bowl and gallery ceiling luminaire with CFL lamp (approx 1x15w). To include lamps and all necessary mounting accessories. Minimum IP44. Insect proof. (C2)	No	12		
	A 6 B 6				
Carried to Collection					
				R	
Bill No. 18					
Electrical Work					

		Unit	Quantity	Rate	Amount
31	Surface mounted ceiling luminaire, with die cast aluminium housing and clear acrylic diffuser. CFL lamp (approx 1x8w). To include lamps and all necessary mounting accessories. Including intergrated daylight switch. Minimum IP 44. Insect proof. (C3)	No	12		
	A 6 B 6				
32	1200mm Surface mounted luminaire. T5 Flourescent lamps (approx 2x 32w). Polycarbonate body,clear polycarbonate diffuser, to include lamps, cover clips, electronic control gear and all necessary accessories. Minimum IP 44. Insect proof. (C4)	No	12		
	A 6 B 6				
	<u>GAS INSTALLATION</u>				
33	Supply and Install Gas Geyser - 14 Litre, Bosch Battery/LPG (WRD 14B31). To include 800mm Flue pipe, powder coated outdoor weather cover and batteries	No	12		
	A 6 B 6				
34	19.7mm gas pipes installed in sleeves to 1 x Stove and 1 x Geyser per unit 1	m	1 100		
	A 550 B 550				
35	Gas Isolation valves	No	24		
	A 12 B 12				
36	Gas Isolation header complete with 14 x Valves at Gas tank cage (header with inlet and outlet valves). 2 x cylinders connected to each block.	No	2		
	A 1 B 1				
37	Cage for 8 x 48kg gas cylinders with lockable gate. Floor mounted	No	1		
	A 1				
38	LPG Filled 48kg gas cylinders from exchange approved gas supplier	No	8		
	A 8				
	<u>TEST AND COMMISSION</u>				
39	Complete testing and commissioning of electrical installation	Item			
	Item 1				
40	Electrical Certificate of compliance (1 per unit and 1 overall).	Item			
	A 13				
41	Gas Certificate of compliance per unit	Item			
	A 12				
42	Earthing and lightning protection with certificate	No	2		
	A 1 B 1				
	Carried to Collection			R	
	Bill No. 18				
	Electrical Work				

Amount

BILL NO. 18
ELECTRICAL WORK
COLLECTION

Page No

Brought Forward from Page

95

96

97

98

99

Carried to Summary

R

NEW 2 X 6 BED STAFF ACCOMMODATION UNITS AT MPILA CAMP IMFOLOZI GAME RESERVE

ELECTRICAL WORKS SUMMARY PAGE

	Page	Amount
BILL NO. 18 ELECTRICAL WORK		
Brought forward from page	100	
Sub Total		R
CARRIED TO FINAL SUMMARY PAGE (FS1)		

**NEW 2 X 6 BED STAFF ACCOMMODATION UNITS
AT MPILA CAMP IMFOLOZI GAME RESERVE**



**PART C3.5:
FINAL SUMMARY PAGE**

**NEW 2 X 6 BED STAFF ACCOMMODATION UNITS
AT MPILA CAMP IMFOLOZI GAME RESERVE**

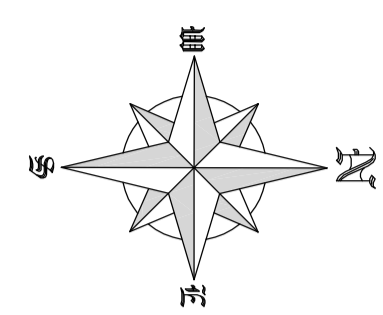


PART D: DRAWINGS

**NEW 2 X 6 BED STAFF ACCOMMODATION UNITS
AT MPILA CAMP IMFOLOZI GAME RESERVE**



**PART D1.1:
ARCHITECTURAL DRAWINGS**



New Septic tanks and French drains designed for total 5no 6 Bed staff accom units. Soak away to be designed in accordance to the geotech's percolation test results.

REV	DESCRIPTION	DATE

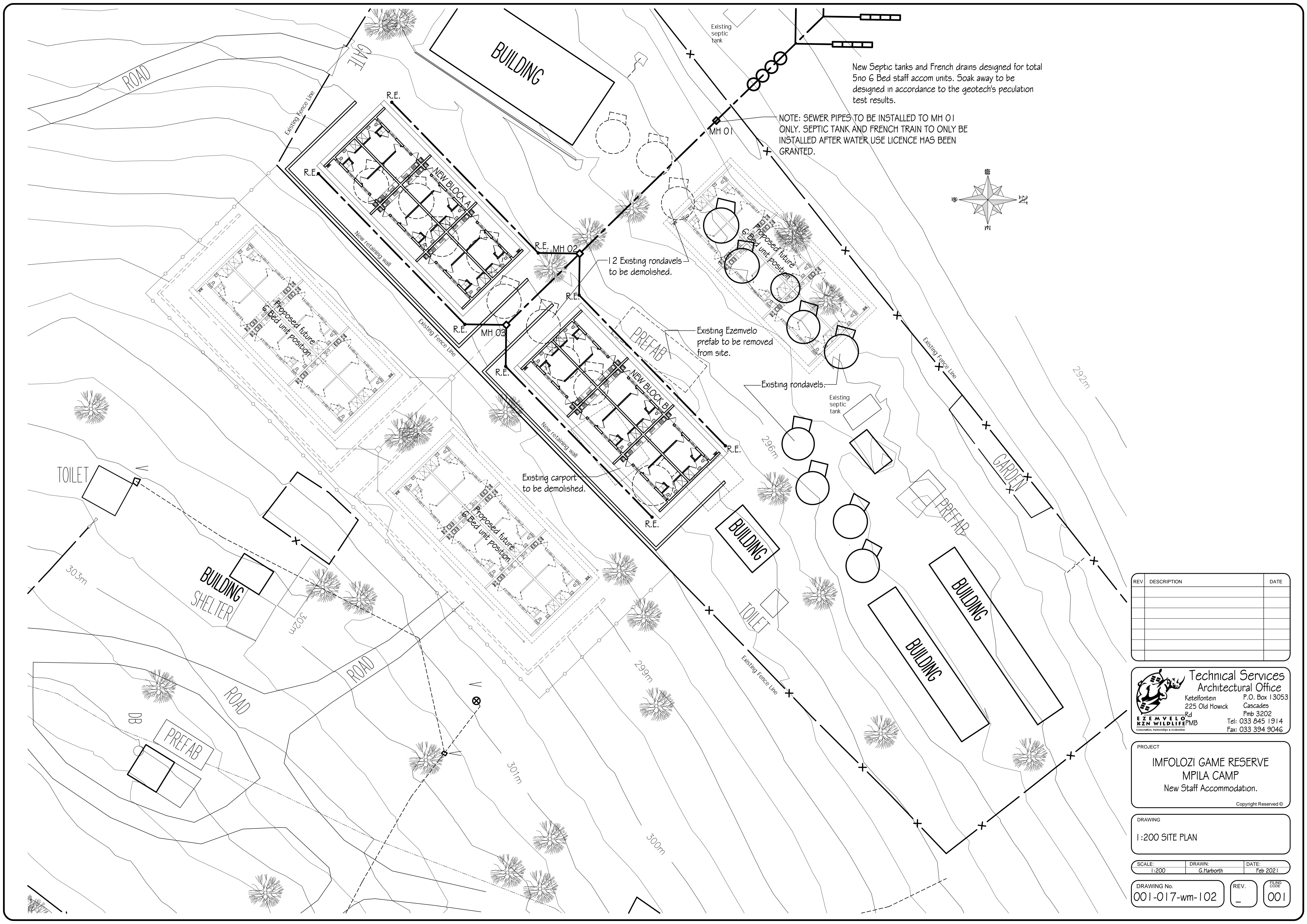
Technical Services Architectural Office
 Ketelfontein P.O. Box 13053
 225 Old Howick Cascades
 Rd Pmb 3202
EZEMVELO KZN WILDLIFE P.M.B. Tel: 033 845 1914
 Fax: 033 394 9046

PROJECT
**IMFOLOZI GAME RESERVE
 MPILA CAMP
 New Staff Accommodation.**
 Copyright Reserved ©

DRAWING
1:500 SITE PLAN

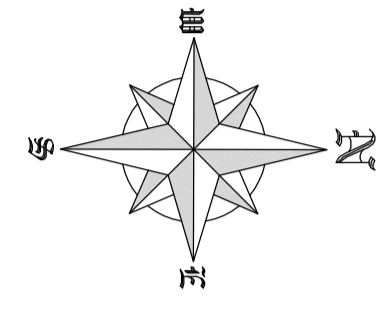
SCALE: 1:500 DRAWN: G.Harboth DATE: Feb 2021

DRAWING No. 001-017-wm-101 REV. DATE: FEB 2021



New Septic tanks and French drains designed for total 5 no 6 Bed staff accom units. Soak away to be designed in accordance to the geotech's percolation test results.

NOTE: SEWER PIPES TO BE INSTALLED TO MH 01 ONLY. SEPTIC TANK AND FRENCH TRAIN TO ONLY BE INSTALLED AFTER WATER USE LICENCE HAS BEEN GRANTED.



REV	DESCRIPTION	DATE

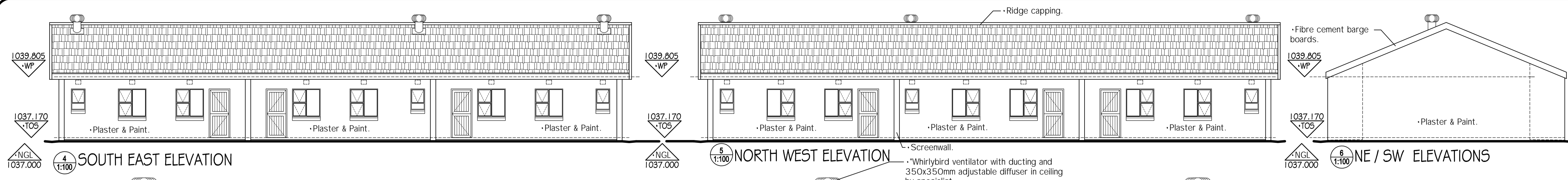
Technical Services Architectural Office
 Ketelfontein P.O. Box 13053
 225 Old Howick Cascades
 Rd Pmb 3202
EZEMVELO KZN WILDLIFE P.M.B. Tel: 033 845 1914
Conservation, Sustainability & Innovation Fax: 033 394 9046

PROJECT
**IMFOLOZI GAME RESERVE
 MPILA CAMP**
 New Staff Accommodation.
 Copyright Reserved ©

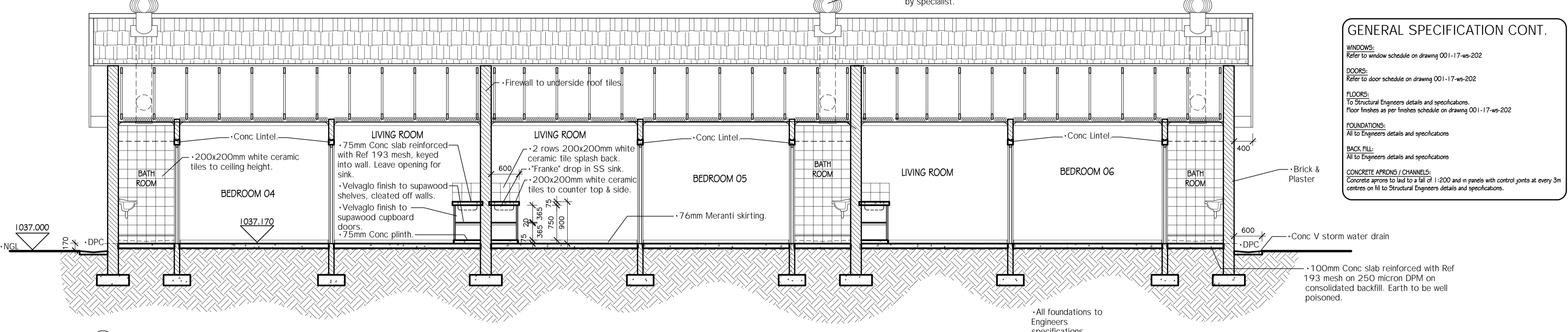
DRAWING
1:200 SITE PLAN

SCALE: 1:200 DRAWN: G. Harborth DATE: Feb 2021

DRAWING No. **001-017-wm-102** REV. **-** FIGURE CODE **001**



GENERAL SPECIFICATION NOTES:
 This specified drawing to be read in conjunction with Standard Prelimines to Trades.
 ALL TRADE NAMES to be as specified.
ROOF:
 Coverland Renew Slate Grey concrete roof tiles on 38x38mm battens @ max 320cc on Sisalation 430FR insulation on engineered timber gangnail trusses by specialist. Certification to be provided. Trusses to be @ max 750cc, fixed to 114x38mm wallplate anchored with galv. hoop iron straps bedded in min 10 courses.
 SISALATION 430FR underlayment under battens and under battens, joints to be sealed with tape.
 INSULATION 100mm Aerolite Think Pink, to be laid on top of ceiling in accordance with manufacturers specifications.
 HURRICANE CLIPS to be provided and secured to battens and tiles.
 Exterior exposed roof timber to be painted with 2 coats ABE PROVONITE, before fixing of roof tiles, fascias and bargeboards.



GENERAL SPECIFICATION CONT.
WINDOWS:
 Refer to window schedule on drawing 001-17-ws-202
DOORS:
 Refer to door schedule on drawing 001-17-ws-202
FLOORS:
 To Structural Engineers details and specifications.
 Floor finishes as per finishes schedule on drawing 001-17-ws-202
FOUNDATIONS:
 All to Engineers details and specifications
BACK FILL:
 All to Engineers details and specifications
CONCRETE APRONS / CHANNELS:
 Concrete aprons to be laid to a fall of 1:200 and in panels with control joints at every 3m centres on fill to Structural Engineers details and specifications.

BRICKWORK:
 Brick walls generally
 Walls to be built in stretcher bond with joints 4 holes filled solid especially on external walls. Joints to be raked out to obtain a good plaster key where to be plastered. Roof trusses shall be galvanized hoop iron built in at least 10 courses where possible. DPCs shall generally be built in as shown on details # as a bond breaker between brickwork & concrete on suspended slabs.
 Brickwork
 Shall be built in all round in the first joint above the DPCs & the first 2 joints above the window head. Remainder of sub-structure & superstructure brickwork shall be reinforced at every 4th course.
 Pointing
 Pointing in face brickwork shall where specified be square and slightly recessed & finished smooth with a steel pointing tool.
 Reinforced brick lintels
 Brick lintels shall unless otherwise indicated on the drawings be brick on edge reinforced in accordance with the following table.

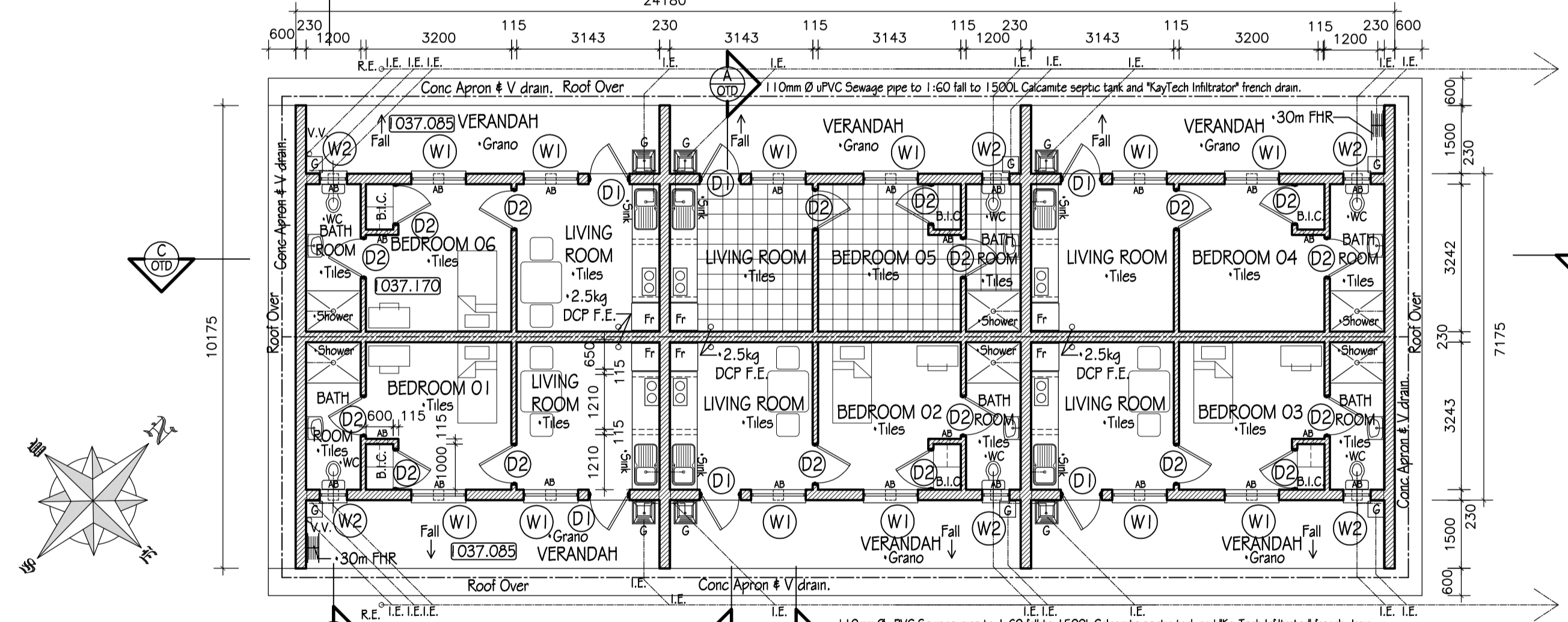
SPAN	LAYERS BRICK	FORCE	MIN CIS BW	(incl BOE c/s)
up to 1m	2		4	
1m to 1,6m	3		5	
1,6m to 2,4m	5		6	
2,4m to 3,0m	2*		6	

*Comprising 3 No 6mm diam high tensile steel rods in each course.
 Prestressed concrete lintels may be used in plastered internal brick walls # to comply with manufacturers specifications.

3 SECTION C-C

ALL DIMENSIONS TO BE CHECKED ON SITE PRIOR TO ANY WORK BEING CARRIED OUT. ALL DISCREPANCIES TO BE DISCUSSED WITH THE ARCHITECT PRIOR TO IMPLEMENTATION THEREOF. THESE DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE STRUCTURAL ENGINEERS DRAWINGS.

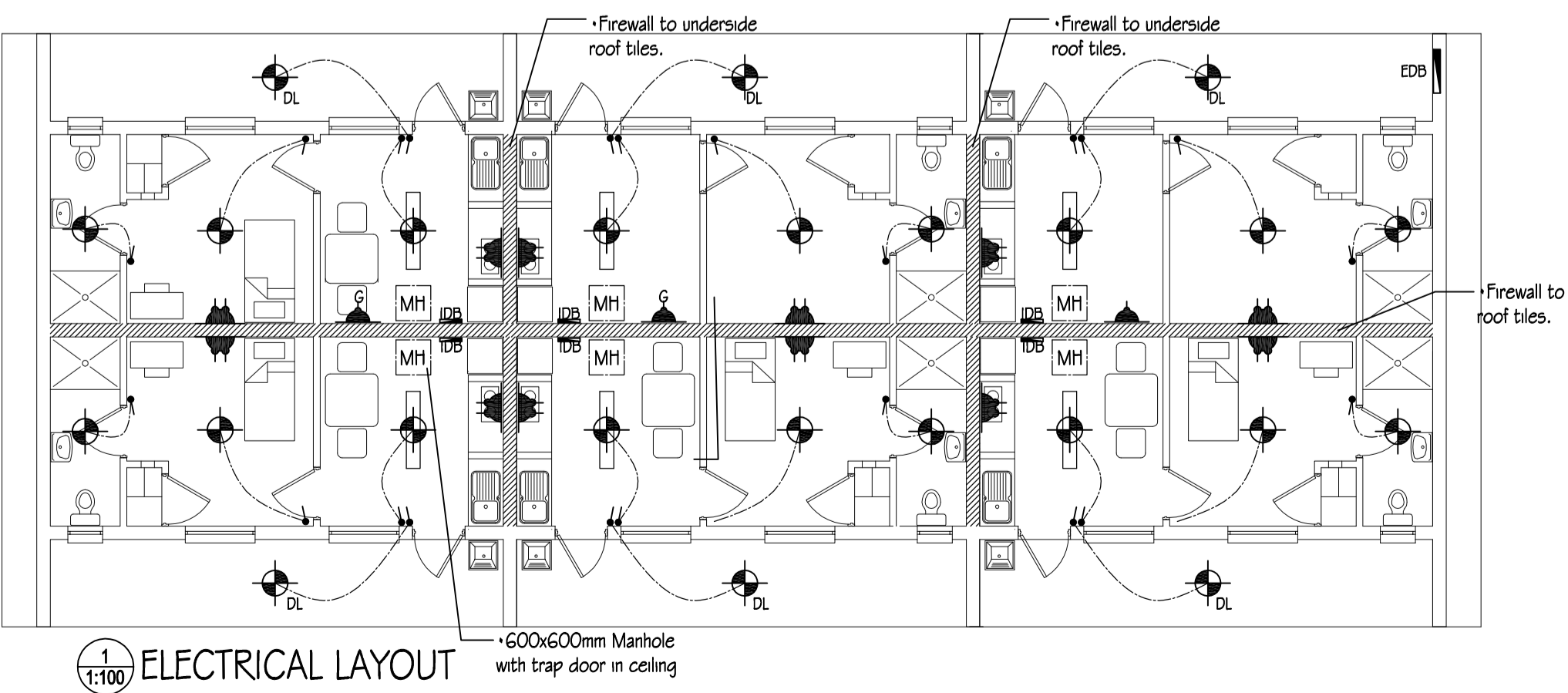
NOTE: EXTENT OF CUT TO BE DETERMINED ON SITE. PLATFORM LEVELS TO BE VERIFIED BY ARCHITECT AND ENGINEER BEFORE FOUNDATION EXCAVATIONS COMMENCE.



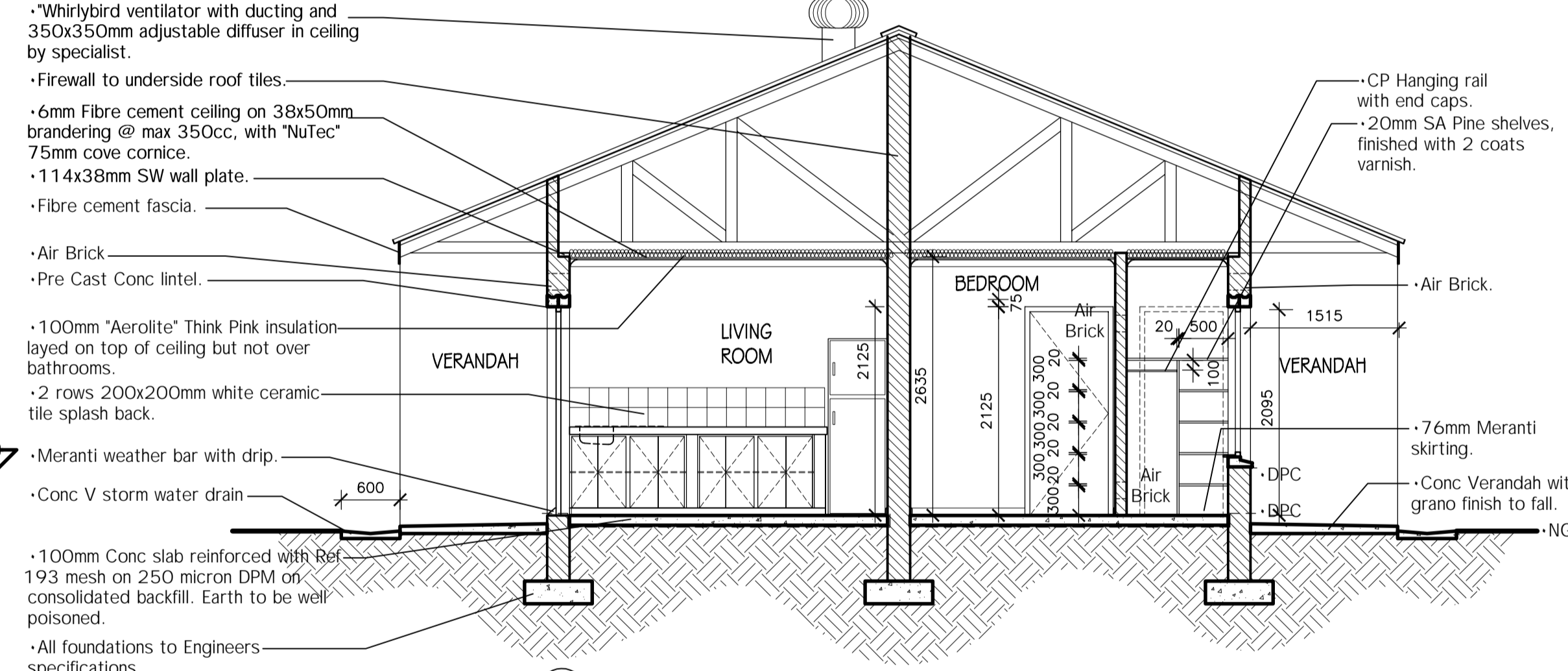
2 PLAN

ELECTRICAL LEGEND

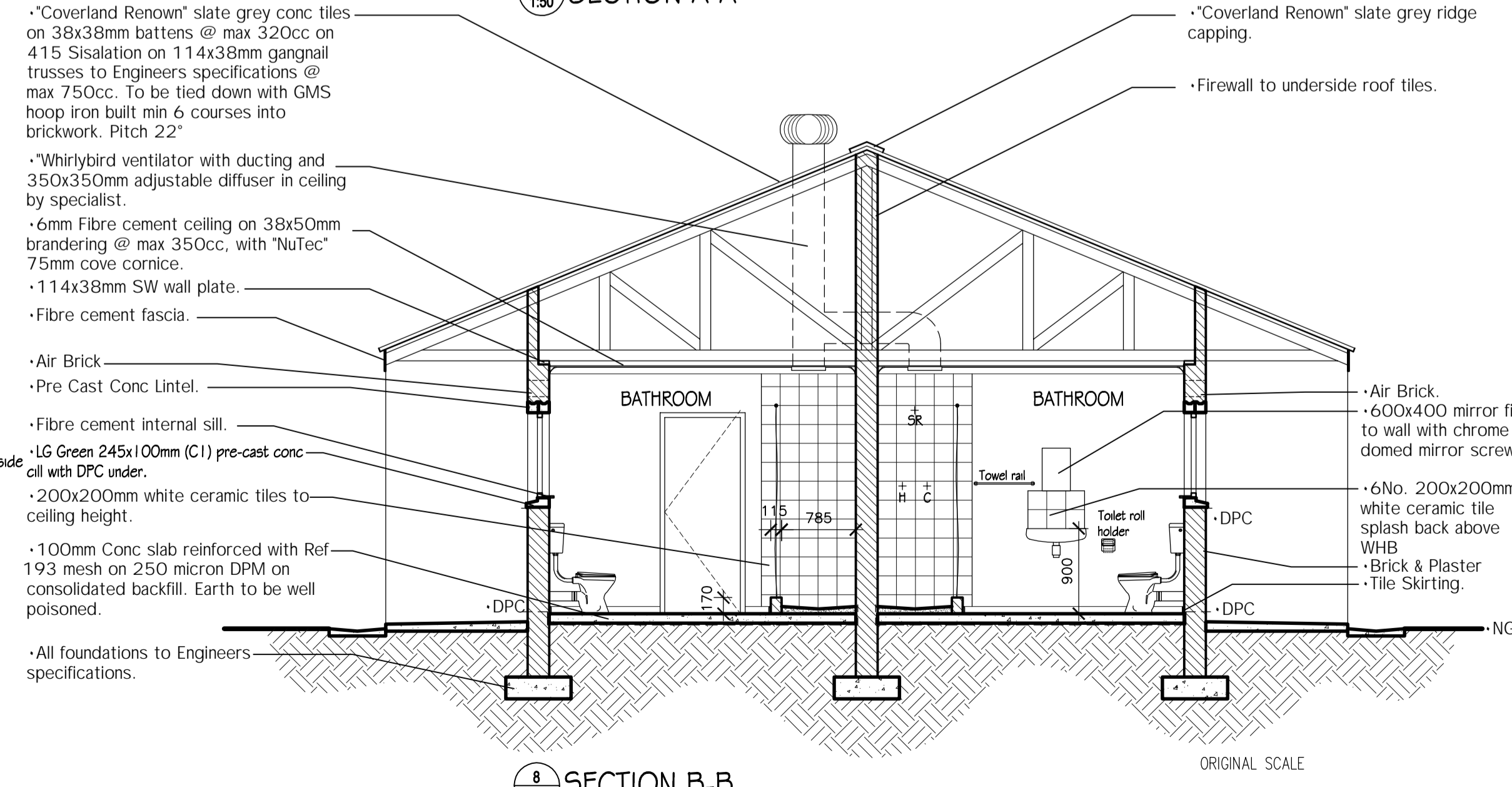
	SINGLE PLUG OUTLET FOR GEYSER IN ROOF SPACE.
	DOUBLE PLUG OUTLET
	200mm DOUBLE TUBE FLUORESCENT INSECT PROOF LIGHT
	CEILING LIGHT WITH LOW ENERGY BULBS
	EXTERNAL CEILING LIGHT WITH LOW ENERGY BULBS AND DAYLIGHT SWITCH
	SWITCH
	EXTERNAL MAIN DISTRIBUTION BOARD
	INTERNAL DISTRIBUTION BOARD



1 ELECTRICAL LAYOUT



7 SECTION A-A



8 SECTION B-B

REV	DESCRIPTION	DATE
A	Sisalation amended to 430FR	23/02/2023
B	Paint colours updated.	23/03/2023

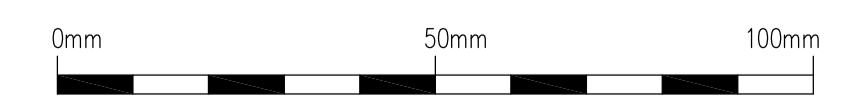
Technical Services Architectural Office
 Ketelfontein P.O. Box 13053
 225 Old Howick Cascades
 Rd Pmb 3202
 EZE MVELO KZN WILDLIFE PMB
 Tel: 033 845 1914
 Fax: 033 394 9046

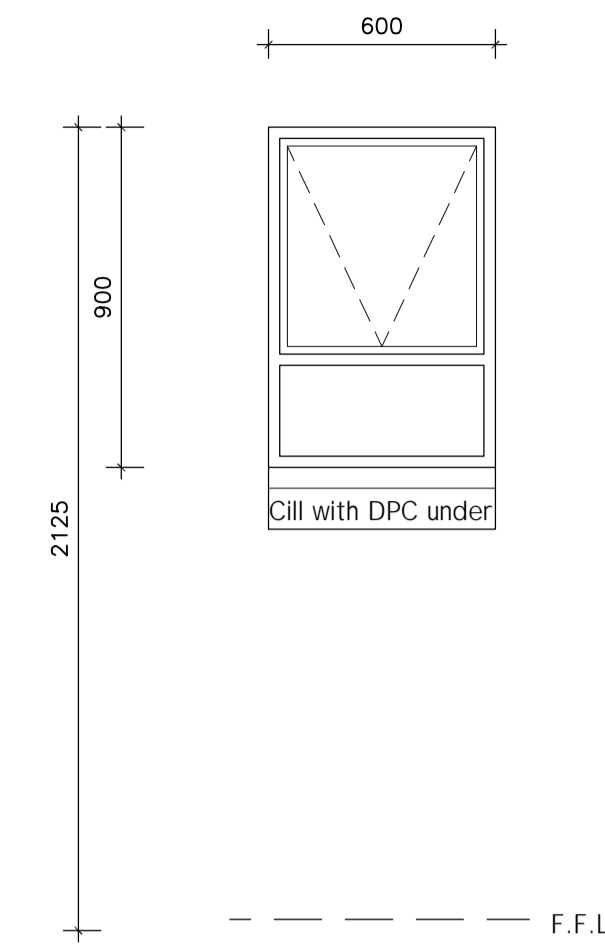
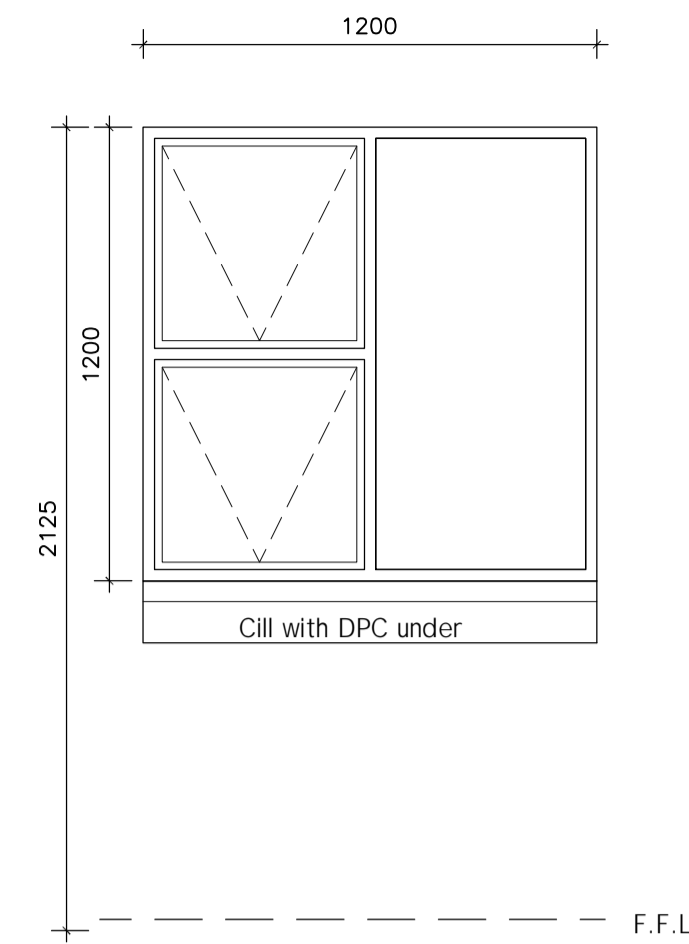
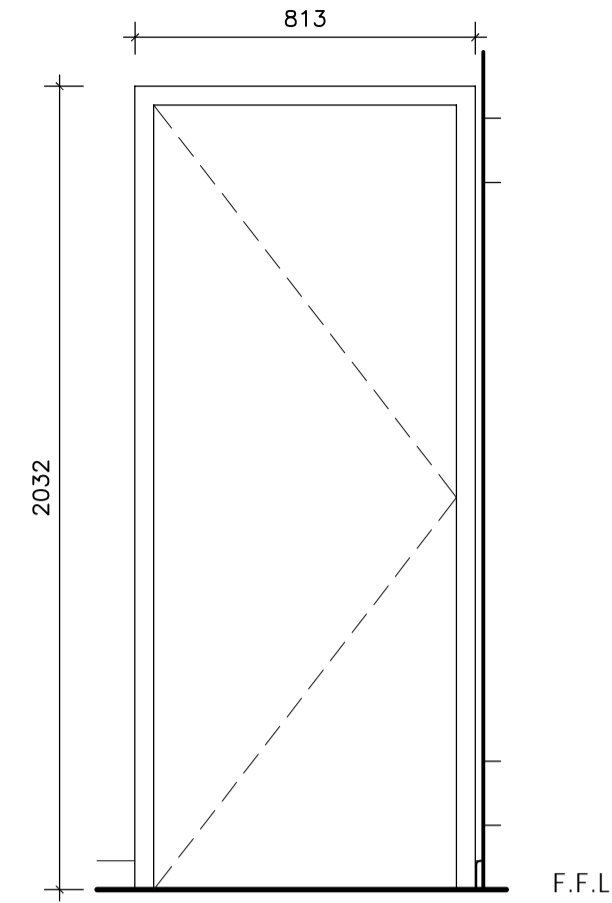
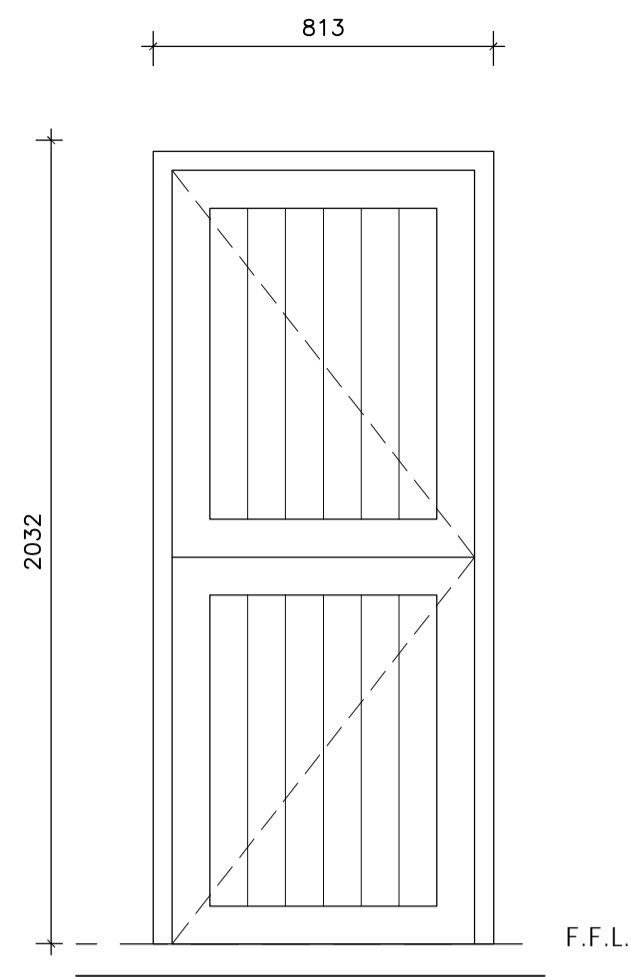
PROJECT
 IMFOLOZI GAME RESERVE
 MPILA CAMP
 New 6 Bed Staff Accommodation Unit.
 Copyright Reserved ©

DRAWING
 PLANS SECTIONS & ELEVATIONS

SCALE:	DRAWN:	DATE:
AS SHOWN	G. Harborth	Feb 2019

DRAWING No.	REV.	PLANS CODE
001-017-wm-201	B	001





DOOR NO.	D1
NO. REQUIRED	6
DOOR DESC.	Meranti framed ledged and braced stable door. (Opening out)
SIZE	813mm Wide x 2032mm High x 44mm Thick
DOOR FINISH	To be sanded, cleaned and painted with 3 coats Dulux Woodguard Timberpreservative G126. 1st Coat to be teak and applied on delivery to site, prior to building in. Further coats to be clear and applied min 24hrs apart.
FRAME DESCRIPTION	EX 76x114mm Meranti.
FRAME FINISH	To be sanded, cleaned and painted with 3 coats Dulux Woodguard Timberpreservative G126. 1st Coat to be teak and applied on delivery to site, prior to building in. Further coats to be clear and applied min 24hrs apart.
LOCATION	Entrance to Living Room
IRONMONGERY	Qty DESCRIPTION
	1 Pair 100mm brass washered brass butts.
	1 Union Gower pattern 3 lever lockset, code: CB 682-24/2277-78/CH
	2 75mm Brass barrel bolts.
	1 Brass cabin hooks.
	1 PVC Key tag.
	1 Brass Number, 50mm High.

DOOR NO.	D2
NO. REQUIRED	18
DOOR DESC.	Solid Core Hardboard flush panel door.
SIZE	813mm Wide x 2032mm High x 44mm Thick
DOOR FINISH	To be sanded, cleaned and painted with one coat undercoat and 2 finishing coats of Plascon Velvagio. Colour: Broken white
FRAME DESCRIPTION	115mm Galv. Standard pressed steel door by Durowin, including 1 pair steel butts.
FRAME FINISH	To be sanded, cleaned and painted with one coat metal primer and 2 finishing coats of Plascon Velvagio. Colour: Broken white
LOCATION	Bedroom, Cupboard, Bathroom
IRONMONGERY	Qty DESCRIPTION
	1 Union Gower pattern 2 lever lockset, code: CB 682 / 2295-CH
	1 Union door stop, plugged and screwed to floor.

WINDOW NO.	W1
NO. REQUIRED	12
SIZE	1200mm wide x 1200mm high
WINDOW DESCRIPTION	DURO Aluminium Residential window PT 1212 fitted with brown powder coated burglar guards by DuroDly fixed with security screws.
FRAME FINISH	Supplied Anodised Anolok Bronze 543.
GLAZING	4mm Clear float glass.
LOCATION	Living Room
IRONMONGERY	As Supplied

WINDOW NO.	W2
NO. REQUIRED	6
SIZE	600mm wide x 900mm high
WINDOW DESCRIPTION	DURO Aluminium Residential window PT 69 fitted with brown powder coated burglar guards by DuroDly fixed with security screws.
FRAME FINISH	Supplied Anodised Anolok Bronze 543.
GLAZING	4mm safety glass, obscure.
LOCATION	Bathroom
IRONMONGERY	As Supplied

2 DOOR SCHEDULE

3 WINDOW SCHEDULE

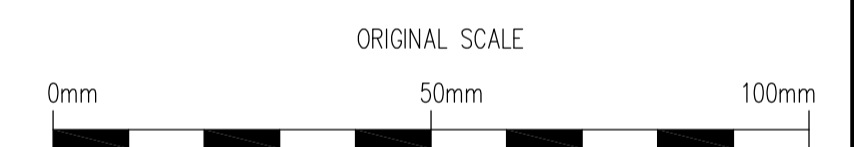
ROOM NAME	LIVING ROOM (x6)
FLOOR	Reinforced concrete surface bed to Structural Engineers details and specifications. 330x330mm Johnson 'Bansta cha latte B5-934' class 4 tiles laid on screed with 'Tal Professional' tile adhesive. Joints to be 10mm wide, grouted with 'Tal Quarrygrout' dark grey. Movement joint 10mm wide all around the perimeter of tiled floor. Joint to be filled with 'SikaFlex' Pro 2HP one component polyurethane flexible sealant. Colour Grey, finish flush.
SKIRTINGS	75mm Meranti Skirting glued and nailed to wall. Finish with 2 coats 'Plascon' Polyurethane satin varnish.
WALLS	Walls to receive one coat plaster (20mm), one coat Plascon 'UC56' plaster primer and 2 finishing coats Plascon Wall n All. Colour to be Soap bubble Code: Y2-E2-2
CURTAIN TRACK	'Kirsh Regular' single track, pre-painted metal curtain rail including runners, end caps and metal fixing brackets.
WORKTOPS	200 x 200mm White Johnson ceramic tiles to top and front edge, laid on concrete slab with white pvc tile edge strips. Fixed with 'Tal Professional' tile adhesive. Joints to be 6mm wide, grouted with 'Tal wall grout, colour light grey. Splash back to be 2 rows high, fixed with 'Tal Professional' tile adhesive. Joints to be 6mm wide, grouted with 'Tal wall grout, colour light grey.
SINK	'Frankie' Quinline QLXG 1 | 55 inset sink, built into conc counter. 'Cobra' 296 Star CP Single taphole sink mixer. 'Cobra' 316 40mm CP sink waste with plug, chain & back nut. 75mm rubber P trap.

ROOM NAME	BATHROOM (x6)
FLOOR	Reinforced concrete surface bed to Structural Engineers details and specifications. 330x330mm Johnson 'Granito - Mid Grey code GN572 class 4 tiles laid on screed with 'Tal Professional' tile adhesive. Joints to be 10mm wide, grouted with 'Tal Quarrygrout' dark grey. Movement joint 10mm wide all around the perimeter of tiled floor. Joint to be filled with 'SikaFlex' Pro 2HP one component polyurethane flexible sealant. Colour Grey, finish flush.
SKIRTINGS	150mm High skirting formed from cut 300x300mm Johnson 'Granito - Charcoal code GN553 class 4 tiles fixed to wall with 'Tal Professional' tile adhesive. Joints to be 10mm wide, grouted with 'Tal Quarrygrout' dark grey.
WALLS	Walls to receive one coat plaster (20mm), one coat Plascon Ment Universal Undercoat (UC1) and 2 finishing coats Plascon Kitchens and Bathrooms, Colour: White. Shower to be waterproofed with 'Tal Sureproof' in strict accordance with manufacturers specifications. To be inspected by Architect before wall tiles are laid. Shower cubicle to be tiled to ceiling height with 200 x 200mm White Johnson or approved ceramic tiles. Fixed with 'Tal Professional' tile adhesive. Joints to be 6mm wide, grouted with 'Tal wall grout, colour light grey.
CURTAIN TRACK	'Kirsh Regular' single track, pre-painted metal curtain rail including runners, end caps and metal fixing brackets.
FITTINGS	Chrome plated shower curtain rail with end fixing caps. 'Frankie' Soap Tray with hooks. Code B5649. To be fitted to shower. 'Frankie' Toilet Roll Holder. Code BS 677. 'Frankie' 600mm Single Towel rail. Code BHM9B 'Union' Rubber tipped hat and coat hook. Code ALB722AS. Fitted to bathroom door with 2 brass screws.
W.H.B.	'Vaal Springbok' Basin Code 7031, fixed to wall with semi-concealed brackets (code 811820). 'Cobra' 401 CP Basin set, comprising 1 pair 15mm 'Cobra' 111 Star pillar taps and 1 'Cobra' 301 basin waste plug, with chain, stay and backnut. 'Cobra' 342 / 50 32mm CP Bottle trap with outlet for 50mm PVC pipe.
W.C.	'Vaal Afsan Aquasave 755199' white vitreous china low level WC suite with 180 degree outlet washdown pan and matching 6 litre 5150 cistern complete with vandal proof lid, fittings and flush pipe. De Lux heavy-duty white plastic double flap seat. 'Cobra' 136-15 Star CP stop tap.

ROOM NAME	BATHROOM (x6) CONTINUED
SHOWER	'Cobra 181 Star' CP Exposed shower mixer, wall type. With No. 020 swanneck overhead riser pipe 990mm high. No. 070CP Shower rose 1/2" x 85mm @ & No. 033CP adjustable holder. 'Cobra 373' 40mm brass shallow seal shower trap with chromium plated grating.
WASH TROUGH (on Verandah under bathroom window)	'Frankie' Mm 55 Single Washtrough Code ET101 'Cobra' 100-15 15mm Plain bib tap, rough brass. 'Cobra' 316 40mm CP sink waste with plug, chain & back nut. 75mm rubber P trap.

ROOM NAME	BEDROOM (x6)
FLOOR	Reinforced concrete surface bed to Structural Engineers details and specifications. 330x330mm Johnson 'Bansta cha latte B5-934' class 4 tiles laid on screed with 'Tal Professional' tile adhesive. Joints to be 10mm wide, grouted with 'Tal Quarrygrout' dark grey. Movement joint 10mm wide all around the perimeter of tiled floor. Joint to be filled with 'SikaFlex' Pro 2HP one component polyurethane flexible sealant. Colour Grey, finish flush.
SKIRTINGS	75mm Meranti Skirting glued and nailed to wall. Finish with 2 coats 'Plascon' Polyurethane satin varnish.
WALLS	Walls to receive one coat plaster (20mm), one coat Plascon 'UC56' plaster primer and 2 finishing coats Plascon Wall n All. Colour to be Soap bubble Code: Y2-E2-2
CURTAIN TRACK	'Kirsh Regular' single track, pre-painted metal curtain rail including runners, end caps and metal fixing brackets.

1 ROOM FINISHING & SANITARYWARE SCHEDULE



REV	DESCRIPTION	DATE
A	Floor tile spec updated. Paint colours updated.	23/03/2023

Technical Services Architectural Office
 Ketelfontein P.O. Box 13053
 225 Old Howick Cascades
 Rd Pmb 3202
E Z E M V E L O K Z N W I L D L I F E P M B
 Tel: 033 845 1914
 Fax: 033 394 9046

PROJECT
**IMFOLOZI GAME RESERVE
 MPILA CAMP**
 New 6 Bed Staff Accommodation Unit.
 Copyright Reserved ©

DRAWING
**DOOR, WINDOW, FINISHES & SAN
 SCHEDULES**

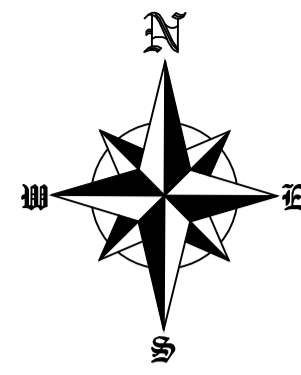
SCALE:	DRAWN:	DATE:
AS SHOWN	G.Harboth	Feb 2019

DRAWING No.	REV.	PLANS CODE
001-017-ws-202	A	001

**NEW 2 X 6 BED STAFF ACCOMMODATION UNITS
AT MPILA CAMP IMFOLOZI GAME RESERVE**

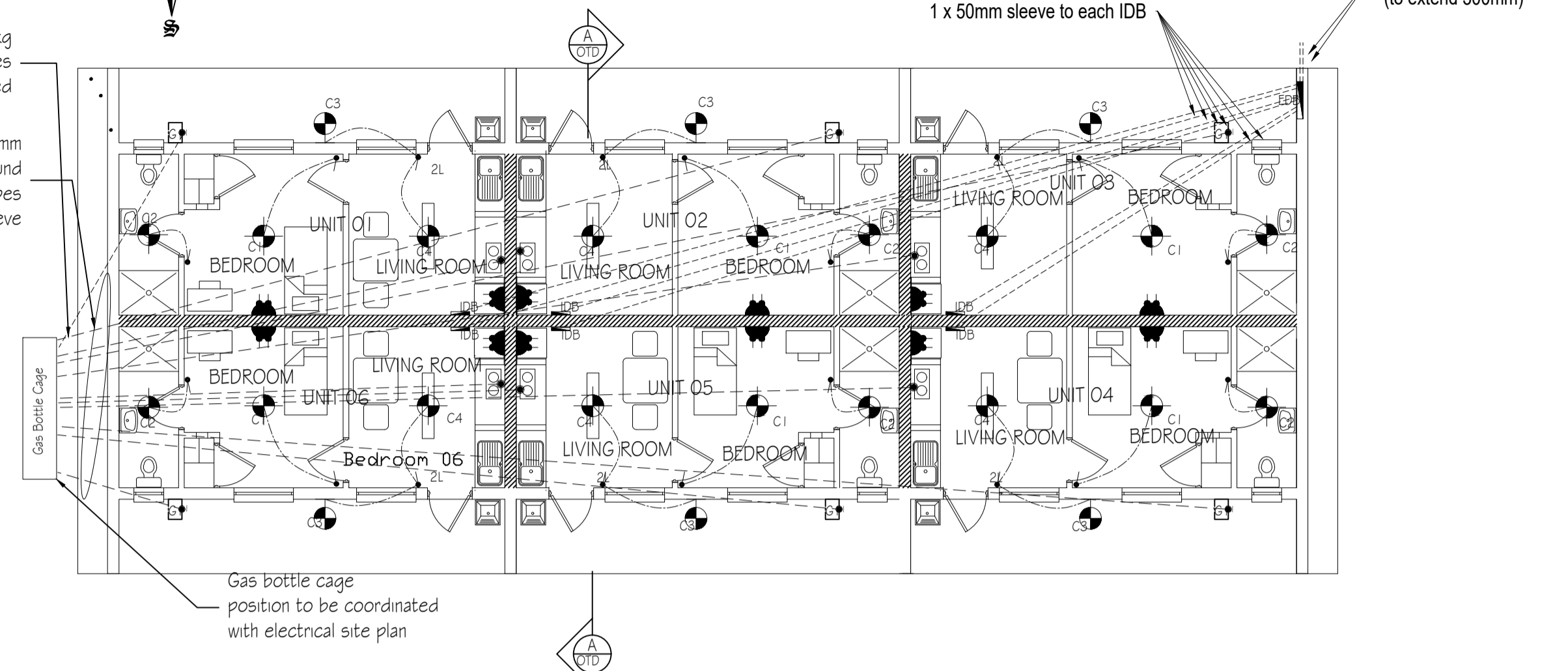


**PART D1.2:
ELECTRICAL DRAWINGS**

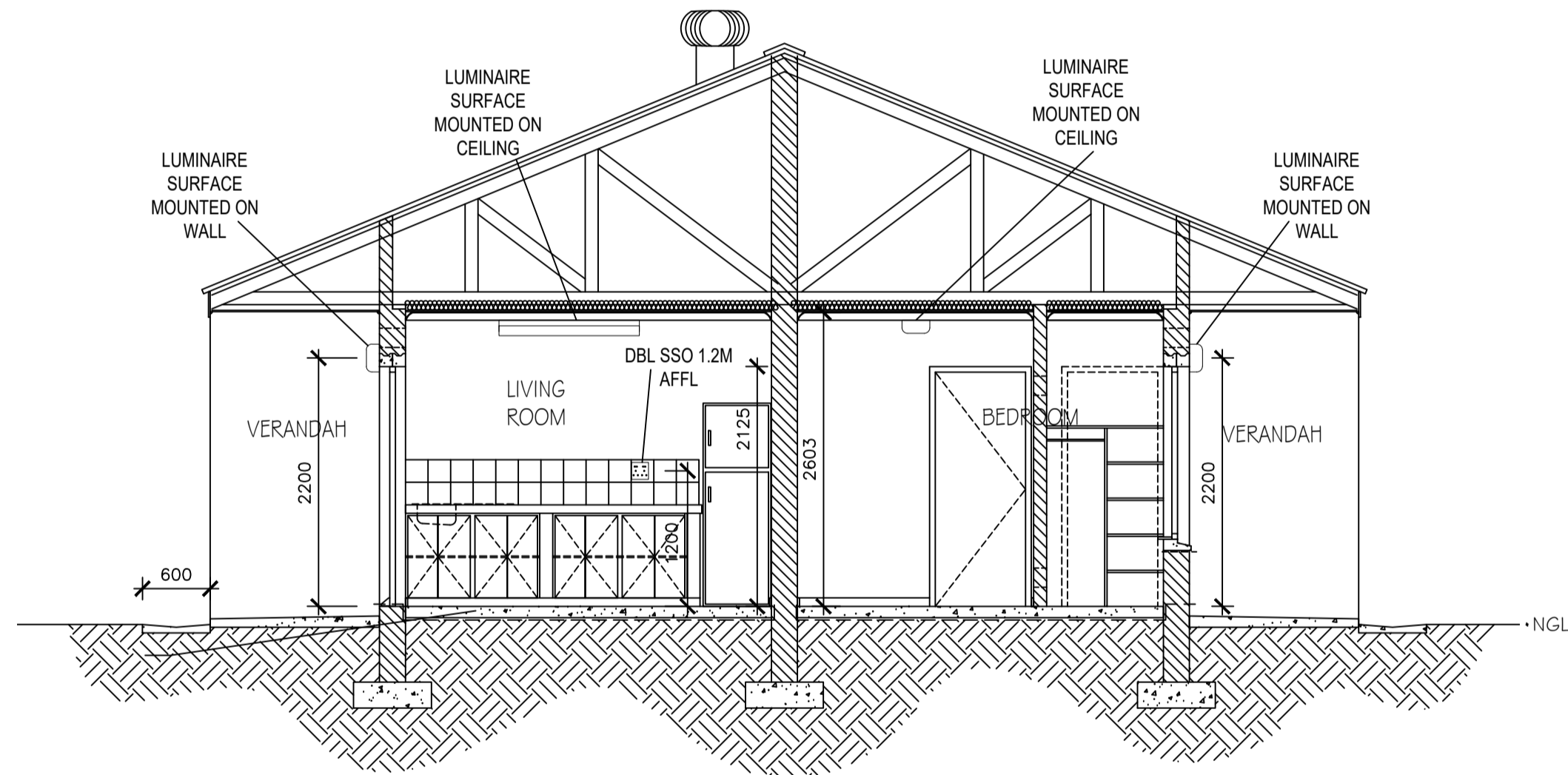


8x 48kg Gas Bottles to be supplied

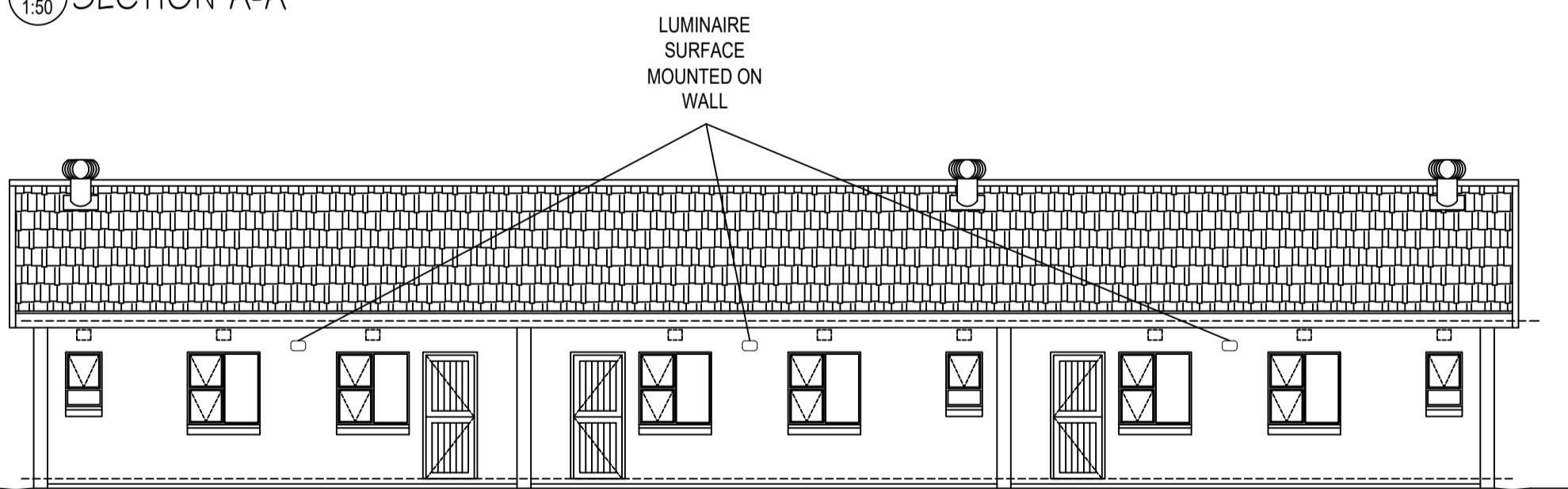
19.7mm underground gas pipes in 50mm sleeve



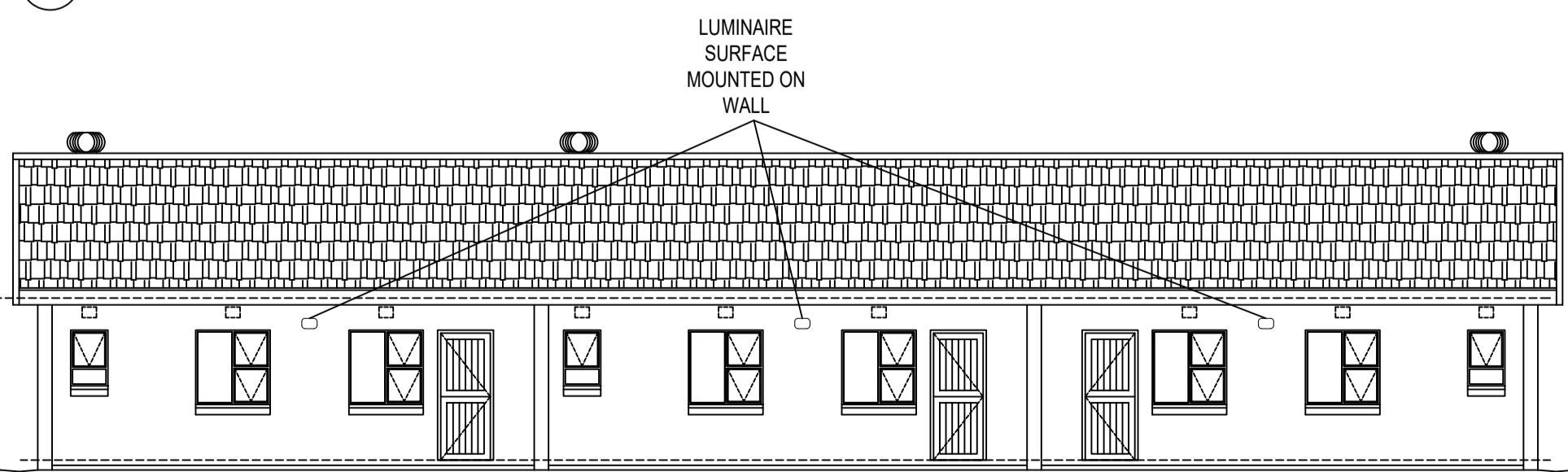
1 BLOCK A & B : ELECTRICAL LAYOUT



2 SECTION A-A



3 SOUTH EAST ELEVATION



4 NORTH WEST ELEVATION

LUMINAIRE SCHEDULE					
TYPE	WATT (Approx)	Quantities	Location	DESCRIPTION (Similar or Equivalent)	Images
C Ceiling Lights					
C1	1X15W	6	Bedrooms	Surface mounted ceiling luminaire, with die cast aluminium housing and matt acrylic diffuser. CFL lamp. To include lamps and all necessary mounting accessories. Minimum IP 44. Insect proof.	
C2	1X15W	6	Toilets	Surface mounted bowl and gallery ceiling luminaire with CFL lamp. To include lamps and all necessary mounting accessories. Minimum IP 44. Insect Proof.	
C3	1X15W	6	Veranda	Surface mounted wall luminaire, with die cast aluminium housing and clear acrylic diffuser. CFL lamp. To include lamps and all necessary mounting accessories. Including integrated daylight switch. Minimum IP 44. Insect proof.	
C4	2X32W	6	Living Room	1200mm Surface mounted luminaire. T5 fluorescent lamps. Polycarbonate body, clear polycarbonate diffuser, to include lamps, cover clips, electronic control gear and all necessary accessories. Minimum IP 44. Insect proof.	

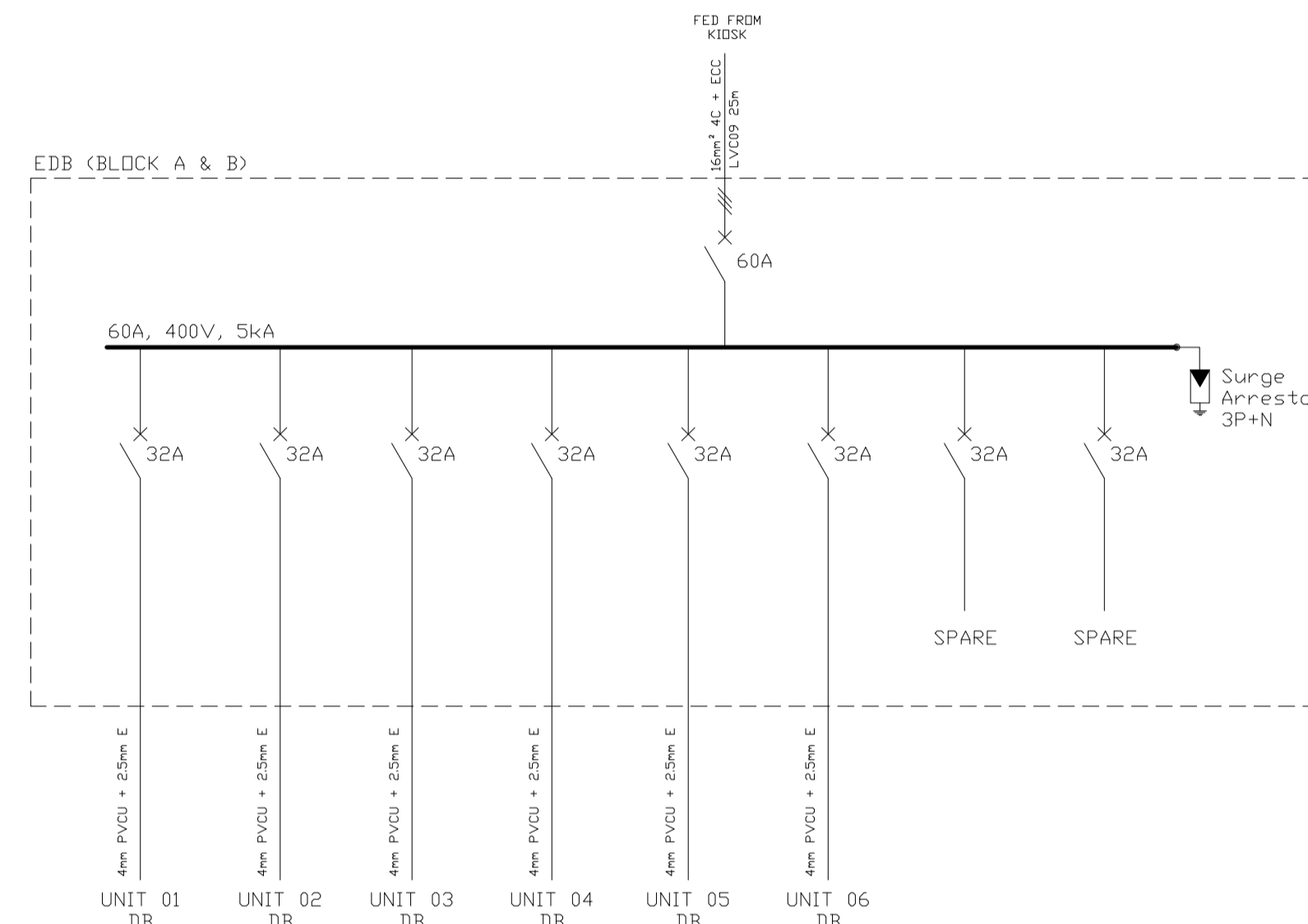
5 LUMINAIRE SCHEDULE

ELECTRICAL LEGEND

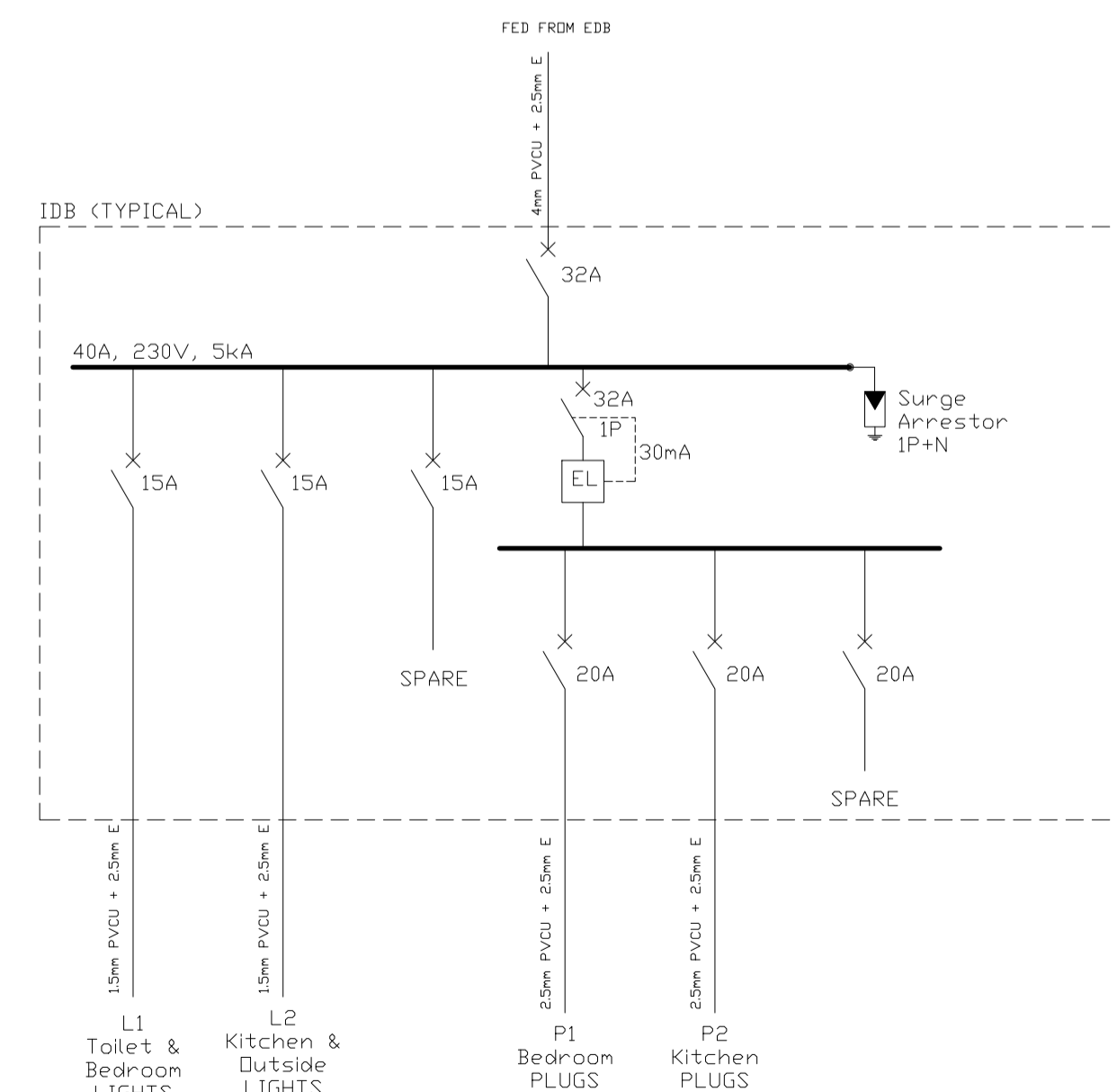
	-DOUBLE PLUG OUTLET
	-1200mm DOUBLE TUBE FLUORESCENT INSECT PROOF LIGHT
	-CEILING LIGHT WITH LOW ENERGY BULBS
	-EXTERNAL WALL LIGHT WITH LOW ENERGY BULBS AND DAYLIGHT SWITCH
	-SWITCH
	-EXTERNAL MAIN DISTRIBUTION BOARD
	-INTERNAL DISTRIBUTION BOARD
	-STOVE/GEYSER VALVE
	-50mm PVC SLEEVE UNDER FLOOR SLAB
	-14L Bosch Battery (Type IWB 14B31) complete with 800mm Flue pipe to include powder coated weather cover

GENERAL NOTES:

- UNLESS OTHERWISE NOTED, ALL DEVICES SHALL BE INSTALLED AT HEIGHTS NOTED. FOR ANY CONTRADICTION INFORMATION, REFER TO ARCHITECTURAL PLANS FOR ALL MOUNTING HEIGHTS AND DIMENSIONS
- GENERAL NOTES APPLY TO ENTIRE ELECTRICAL DRAWING SET. DRAWING NOTES APPLY TO ASSOCIATED DRAWINGS. PLAN KEYED NOTES APPLY WHERE INDICATED.
- DO NOT SCALE OR DIMENSION FROM THESE DRAWINGS.
- REFER TO ARCHITECTURAL, ELECTRICAL AND MECHANICAL PLANS, ELEVATIONS, AND DETAILS FOR LOCATIONS OF CEILING ELEMENTS (LIGHT FITTINGS, DIFFUSERS, ETC.) AND WALL MOUNTED DEVICES. IF LOCATION FOR ITEM IS NOT SHOWN ON ABOVE LISTED DRAWINGS, VERIFY CRITICAL AREAS WITH FIELD PROJECT MANAGER.
- ELECTRICAL SYSTEMS INDICATED ON DRAWINGS ARE DIAGRAMMATIC AND ADDITIONAL WORK, INCLUDING NECESSARY CIRCUITRY, SHALL BE PROVIDED TO MAKE SYSTEMS COMPLETE AND IN SAFE WORKING ORDER. COORDINATE WORK WITH OTHER TRADES.
- INDICATED CIRCUIT RUNS ARE DIAGRAMMATIC. SIZE AND LOCATION PULL BOXES PER SANS 10142 AND COORDINATE WITH OTHER DISCIPLINES. BUILDING CONDITIONS SHALL DETERMINE ACTUAL CONDUIT RUNS.
- MAIN INCOMING SUPPLY TO BE DETERMINED.
- ALL LIGHTS TO BE APPROVED BY THE ENGINEER PRIOR TO PURCHASE.
- UPON JOB COMPLETION, PROVIDE AS-BUILT DRAWINGS ACCURATELY DEPICTING FINAL CONSTRUCTION.
- SPARE SPACE OF 30% TO BE ALLOWED IN ALL DB'S.
- CONTRACTOR TO ENSURE THAT ALL LOADS ARE BALANCED PER FINAL LOAD CONNECTIONS
- FULL INSTALLATION TO COMPLY WITH SANS 10142.
- CERTIFICATE OF COMPLIANCE TO BE ISSUED BY COMPETENT PERSON UPON COMPLETION OF INSTALLATION.



6 EDB SCHEMATIC DIAGRAM



7 IDB SCHEMATIC DIAGRAM (TYPICAL)

REV	DESCRIPTION	DATE
A	For Approval	09/03/2021
B	For Approval	31/01/2023
C	For Approval	14/02/2023
D	For Tender	16/02/2023

Technical Services Architectural Office
 Ketelfontein P.O. Box 13053
 225 Old Howick Cascades
 Rd Fmb 3202
 EZEVELO KZN WILDLIFE PMB Tel: 033 845 1914
 Concessions, Partnerships & Extension Fax: 033 394 9046

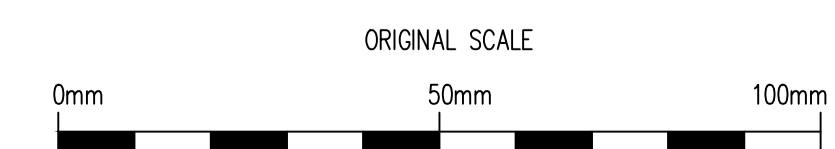
DNA CONSULTING
 ENGINEERS AND PROJECT MANAGERS
 DNA Consulting Engineers & Project Managers
 CBI Building
 635 Peter Mokaba Ridge
 Morningside
 KwaZulu Natal
 4001
 P.O. Box 1058
 Westville
 3630
 Tel: 031 207 1576
 031 207 3842
 Fax: 086 553 8642
 Email: info@dnaengineers.co.za

PROJECT
 IMFOLOZI GAME RESERVE
 MPILA CAMP 2
 New 6 Bed Staff Accommodation Unit.
 BLOCK - A & B
 Copyright Reserved ©

DRAWING
 PLANS SECTIONS & ELEVATIONS

SCALE:	DRAWN:	DATE:
AS SHOWN (A1)	J.Moolley	14/02/2023

DRAWING No.	REV.	FILED CODE
001-013-ELE-002	D	001





ELECTRICAL LEGEND	
	•DOUBLE PLUG OUTLET
	•1200mm DOUBLE TUBE FLUORESCENT INSECT PROOF LIGHT
	•CEILING LIGHT WITH LOW ENERGY BULBS
	•EXTERNAL WALL LIGHT WITH LOW ENERGY BULBS AND DAYLIGHT SWITCH
	•SWITCH
	•EXTERNAL MAIN DISTRIBUTION BOARD
	•INTERNAL DISTRIBUTION BOARD
	•STOVE/GEYSER VALVE
	•50mm PVC SLEEVE UNDER FLOOR SLAB
	•19.7mm UNDERGROUND GAS PIPES IN 50mm SLEEVES
	•35mm UNDERGROUND CABLE IN 50mm SLEEVES
	•DISTRIBUTION KIOSK

GENERAL NOTES:

- UNLESS OTHERWISE NOTED, ALL DEVICES SHALL BE INSTALLED AT HEIGHTS NOTED. FOR ANY CONTRADICTING INFORMATION, REFER TO ARCHITECTURAL PLANS FOR ALL MOUNTING HEIGHTS AND DIMENSIONS
- GENERAL NOTES APPLY TO ENTIRE ELECTRICAL DRAWING SET. DRAWING NOTES APPLY TO ASSOCIATED DRAWINGS. PLAN KEYED NOTES APPLY WHERE INDICATED.
- DO NOT SCALE OR DIMENSION FROM THESE DRAWINGS.
- REFER TO ARCHITECTURAL, ELECTRICAL AND MECHANICAL PLANS, ELEVATIONS, AND DETAILS FOR LOCATIONS OF CEILING ELEMENTS < LIGHT FITTINGS, DIFFUSERS, ETC.) AND WALL MOUNTED DEVICES. IF LOCATION FOR ITEM IS NOT SHOWN ON ABOVE LISTED DRAWINGS, VERIFY CRITICAL AREAS WITH FIELD PROJECT MANAGER.
- ELECTRICAL SYSTEMS INDICATED ON DRAWINGS ARE DIAGRAMMATIC AND ADDITIONAL WORK, INCLUDING NECESSARY CIRCUITRY, SHALL BE PROVIDED TO MAKE SYSTEMS COMPLETE AND IN SAFE WORKING ORDER. COORDINATE WORK WITH OTHER TRADES.
- INDICATED CIRCUIT RUNS ARE DIAGRAMMATIC. SIZE AND LOCATION PULL BOXES PER SANS 10142 AND COORDINATE WITH OTHER DISCIPLINES. BUILDING CONDITIONS SHALL DETERMINE ACTUAL CONDUIT RUNS.
- MAIN INCOMING SUPPLY TO BE DETERMINED.
- ALL LIGHTS TO BE APPROVED BY THE ENGINEER PRIOR TO PURCHASE.
- UPON JOB COMPLETION, PROVIDE AS-BUILT DRAWINGS ACCURATELY DEPICTING FINAL CONSTRUCTION.
- SPARE SPACE OF 30% TO BE ALLOWED IN ALL DB'S.
- CONTRACTOR TO ENSURE THAT ALL LOADS ARE BALANCED PER FINAL LOAD CONNECTIONS
- FULL INSTALLATION TO COMPLY WITH SANS 10142.
- CERTIFICATE OF COMPLIANCE TO BE ISSUED BY COMPETANT PERSON UPON COMPLETION OF INSTALLATION.

GENERAL NOTES:

- 19.7mm UNDERGROUND GAS PIPES IN 50mm SLEEVES TO BE INSTALLED BELOW SEWER LINES.

REV	DESCRIPTION	DATE
A	For Tender	20/02/2023

Technical Services Architectural Office
 Ketelfontein P.O. Box 13053
 225 Old Howick Cascades
 Rm 3202 Pmb 3202
 Tel: 033 845 1914
 Fax: 033 394 9046

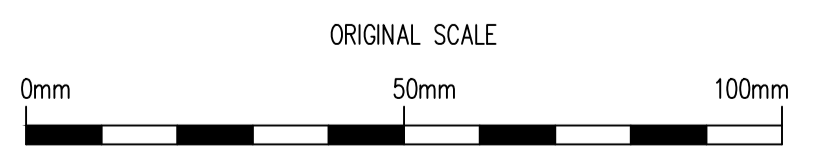
DNA CONSULTING
 ENGINEERS AND PROJECT MANAGERS
 DNA Consulting Engineers & Project Managers
 CBI Building
 635 Peter Mokaba Ridge
 Morningside
 KwaZulu-Natal
 4001
 Tel: 031 207 1576
 031 207 3642
 P.O. Box 1058 Westville Fax: 086 553 8642
 3630 Email: info@dnaengineers.co.za

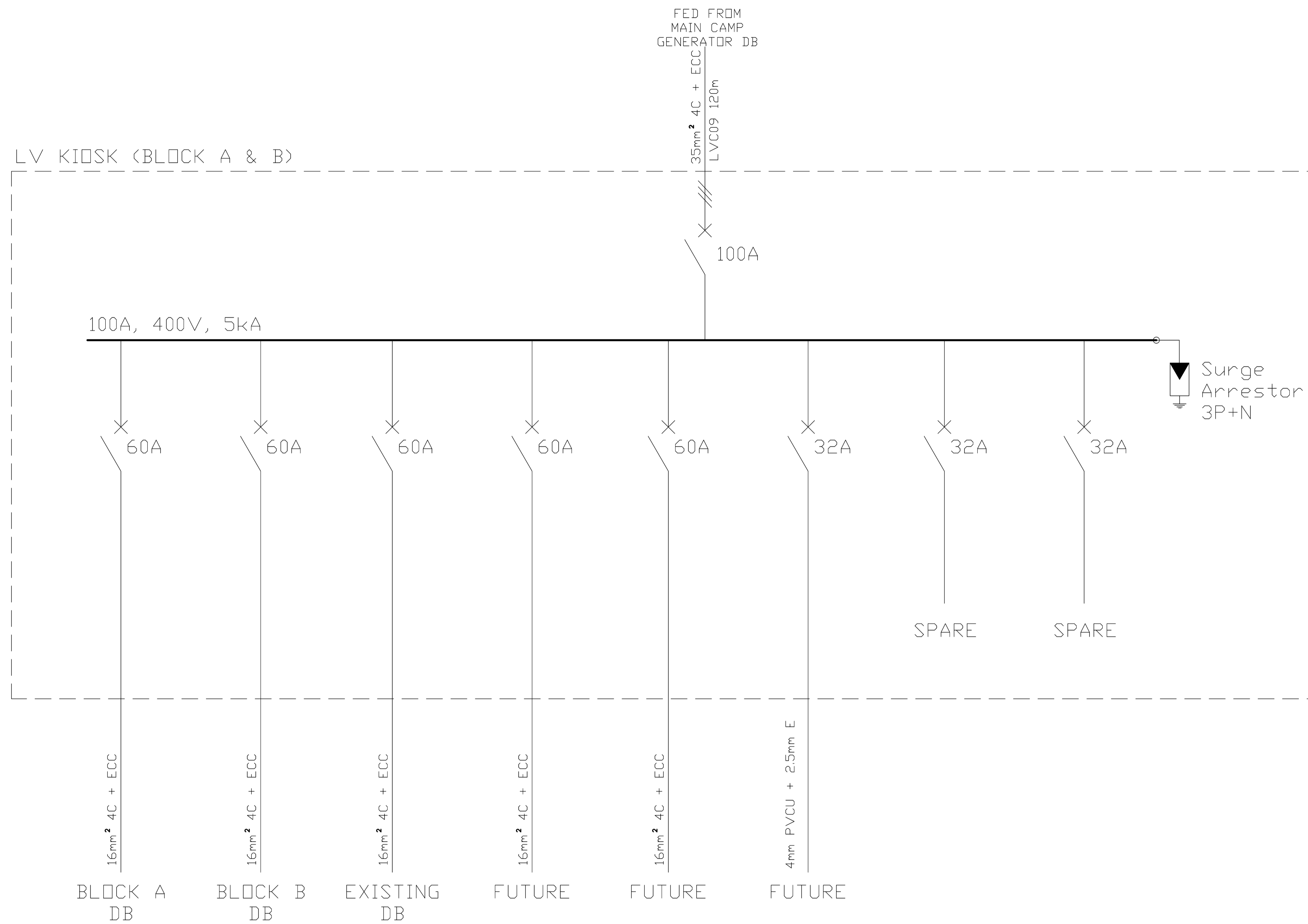
PROJECT
 IMFOLOZI GAME RESERVE
 MPILA CAMP 2
 New 6 Bed Staff Accommodation Unit.
 BLOCK - A & B
 Copyright Reserved ©

DRAWING
 ELECTRICAL SITE PLAN

SCALE: AS SHOWN (A1)	DRAWN: J.Moodley	DATE: 20/02/2023
DRAWING No. 001-013-ELE-003	REV. A	FILED CODE 001

1
1:200 NORTH WEST ELEVATION





MAIN LV KIOSK SCHEMATIC DIAGRAM

GENERAL NOTES:

- UNLESS OTHERWISE NOTED, ALL DEVICES SHALL BE INSTALLED AT HEIGHTS NOTED. FOR ANY CONTRADICTION INFORMATION, REFER TO ARCHITECTURAL PLANS FOR ALL MOUNTING HEIGHTS AND DIMENSIONS.
- GENERAL NOTES APPLY TO ENTIRE ELECTRICAL DRAWING SET. DRAWING NOTES APPLY TO ASSOCIATED DRAWINGS. PLAN KEYED NOTES APPLY WHERE INDICATED.
- DO NOT SCALE OR DIMENSION FROM THESE DRAWINGS.
- REFER TO ARCHITECTURAL, ELECTRICAL AND MECHANICAL PLANS, ELEVATIONS, AND DETAILS FOR LOCATIONS OF CEILING ELEMENTS (LIGHT FITTINGS, DIFFUSERS, ETC) AND WALL MOUNTED DEVICES. IF LOCATION FOR ITEM IS NOT SHOWN ON ABOVE LISTED DRAWINGS, VERIFY CRITICAL AREAS WITH FIELD PROJECT MANAGER.
- ELECTRICAL SYSTEMS INDICATED ON DRAWINGS ARE DIAGRAMMATIC AND ADDITIONAL WORK, INCLUDING NECESSARY CIRCUITRY, SHALL BE PROVIDED TO MAKE SYSTEMS COMPLETE AND IN SAFE WORKING ORDER. COORDINATE WORK WITH OTHER TRADES.
- INDICATED CIRCUIT RUNS ARE DIAGRAMMATIC. SIZE AND LOCATION PULL BOXES PER SANS 10142 AND COORDINATE WITH OTHER DISCIPLINES. BUILDING CONDITIONS SHALL DETERMINE ACTUAL CONDUIT RUNS.
- MAIN INCOMING SUPPLY TO BE DETERMINED.
- ALL LIGHTS TO BE APPROVED BY THE ENGINEER PRIOR TO PURCHASE.
- UPON JOB COMPLETION, PROVIDE AS-BUILT DRAWINGS ACCURATELY DEPICTING FINAL CONSTRUCTION.
- SPARE SPACE OF 30% TO BE ALLOWED IN ALL DB'S.
- CONTRACTOR TO ENSURE THAT ALL LOADS ARE BALANCED PER FINAL LOAD CONNECTIONS.
- FULL INSTALLATION TO COMPLY WITH SANS 10142.
- CERTIFICATE OF COMPLIANCE TO BE ISSUED BY COMPETANT PERSON UPON COMPLETION OF INSTALLATION.

REV	DESCRIPTION	DATE
A	For Approval	09/03/2021
B	For Approval	31/01/2023
C	For Tender	17/02/2023

Technical Services Architectural Office
 Kettelfontein P.O. Box 13053
 225 Old Howick Cascades
 Rd Pmb 3202
 P.O. Box 1914
 KZN WILDLIFE P.M.B. Fax: 033 394 9046
 Conservation, Parks and Recreation

DNA CONSULTING
 ENGINEERS AND PROJECT MANAGERS
DNA Consulting Engineers & Project Managers
 CBI Building
 639 Peter Mokaba Ridge
 Morningside
 KwaZulu Natal
 4001
 P.O. Box 1058 Westville 3630
 Tel: 031 207 1576
 031 207 2842
 Fax: 031 207 1576
 Email: info@dnaengineers.co.za




PROJECT
**IMFOLOZI GAME RESERVE
 MPILA CAMP 2
 LV KIOSK SCHEMATIC DIAGRAM BLOCK-A
 & BLOCK - B**
 Copyright Reserved ©

DRAWING
 MAIN LV KIOSK SCHEMATIC DIAGRAM

SCALE:	DRAWN:	DATE:
AS SHOWN (A1)	X. P. Nhlabathi	17/02/2023

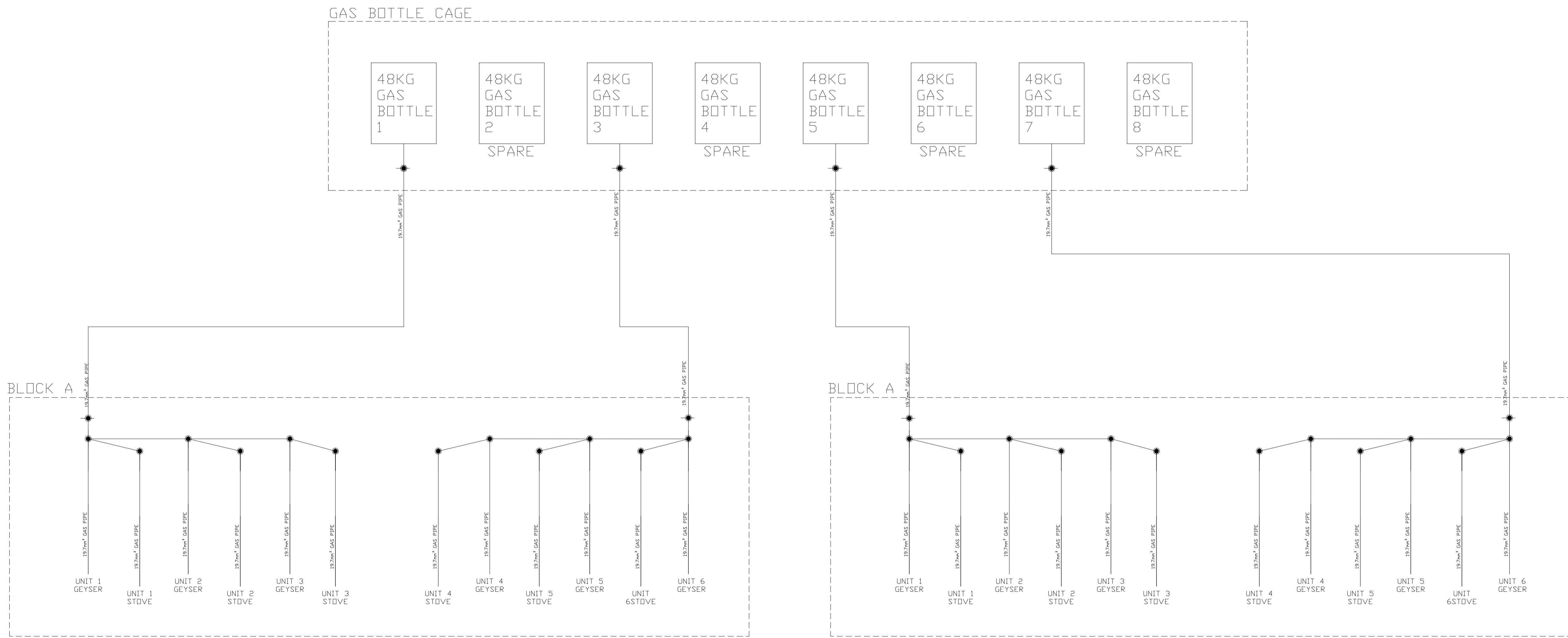
DRAWING No.	REV.	FILE CODE
001-013-ELE-004	C	001



ELECTRICAL LEGEND	
	- ISOLATOR VALVE
	- STOVE/GEYSERS VALVE
	- 19.7mm FUEL PIPE

GENERAL NOTES:

- UNLESS OTHERWISE NOTED, ALL DEVICES SHALL BE INSTALLED AT HEIGHTS NOTED. FOR ANY CONTRADICTION INFORMATION, REFER TO ARCHITECTURAL PLANS FOR ALL MOUNTING HEIGHTS AND DIMENSIONS.
- GENERAL NOTES APPLY TO ENTIRE ELECTRICAL DRAWING SET. DRAWING NOTES APPLY TO ASSOCIATED DRAWINGS. PLAN KEYED NOTES APPLY WHERE INDICATED.
- DO NOT SCALE OR DIMENSION FROM THESE DRAWINGS.
- REFER TO ARCHITECTURAL, ELECTRICAL AND MECHANICAL PLANS, ELEVATIONS, AND DETAILS FOR LOCATIONS OF CEILING ELEMENTS (LIGHT FITTINGS, DIFFUSERS, ETC) AND WALL MOUNTED DEVICES. IF LOCATION FOR ITEM IS NOT SHOWN ON ABOVE LISTED DRAWINGS, VERIFY CRITICAL AREAS WITH FIELD PROJECT MANAGER.
- ELECTRICAL SYSTEMS INDICATED ON DRAWINGS ARE DIAGRAMMATIC AND ADDITIONAL WORK, INCLUDING NECESSARY CIRCUITRY, SHALL BE PROVIDED TO MAKE SYSTEMS COMPLETE AND IN SAFE WORKING ORDER. COORDINATE WORK WITH OTHER TRADES.
- INDICATED CIRCUIT RUNS ARE DIAGRAMMATIC. SIZE AND LOCATION PULL BOXES PER SANS 10142 AND COORDINATE WITH OTHER DISCIPLINES. BUILDING CONDITIONS SHALL DETERMINE ACTUAL CONDUIT RUNS.
- MAIN INCOMING SUPPLY TO BE DETERMINED.
- ALL LIGHTS TO BE APPROVED BY THE ENGINEER PRIOR TO PURCHASE.
- UPON JOB COMPLETION, PROVIDE AS-BUILT DRAWINGS ACCURATELY DEPICTING FINAL CONSTRUCTION.
- SPARE SPACE OF 30% TO BE ALLOWED IN ALL DB'S.
- CONTRACTOR TO ENSURE THAT ALL LOADS ARE BALANCED PER FINAL LOAD CONNECTIONS.
- FULL INSTALLATION TO COMPLY WITH SANS 10142.
- CERTIFICATE OF COMPLIANCE TO BE ISSUED BY COMPETANT PERSON UPON COMPLETION OF INSTALLATION.



GAS LINE SCHEMATIC DIAGRAM

REV	DESCRIPTION	DATE
A	For Tender	22/02/2023

Technical Services Architectural Office
 Kestelfontein P.O. Box 13053
 225 Old Howick Cascades
 Rd Pmb 3202
 KZN WILDLIFE P.M.B. Tel: 033 845 1914
 Conservation, Rehabilitation & Education Fax: 033 394 9046

DNA CONSULTING
 ENGINEERS AND PROJECT MANAGERS
DNA Consulting Engineers & Project Managers
 CBI Building
 639 Pieter Mokaba Ridge
 Morningside
 KwaZulu Natal
 4001
 P.O. Box 1058 Westville 3630
 Tel: 031 207 1576
 031 207 2842
 Fax: 031 207 1842
 Email: info@dnaengineers.co.za

PROJECT
 IMFOLOZI GAME RESERVE
 MPILA CAMP 2
 New 6 Bed Staff Accommodation Unit.
 BLOCK - A # B
 Copyright Reserved ©

DRAWING
 GAS LINE SCHEMATIC DIAGRAM

SCALE:	DRAWN:	DATE:
AS SHOWN (A1)	J.Moodley	22/02/2023

DRAWING No.
 001-013-ELE-005
REV.
 A
FIELD CODE
 001

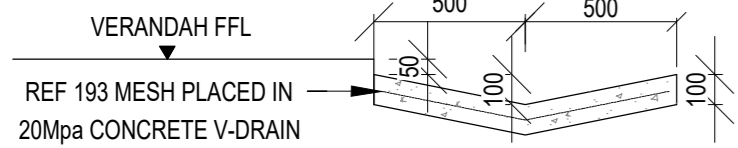


**NEW 2 X 6 BED STAFF ACCOMMODATION UNITS
AT MPILA CAMP IMFOLOZI GAME RESERVE**



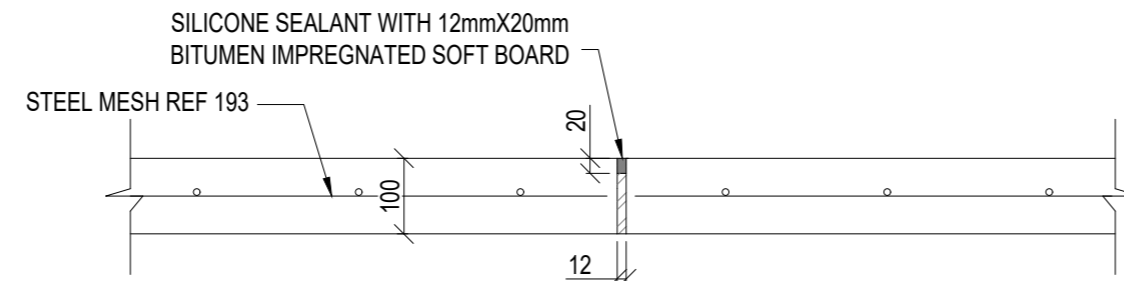
**PART D1.3:
STRUCTURAL AND CIVIL DRAWINGS**

V-DRAIN TO BE CAST IN ALTERNATE 2m PANELS



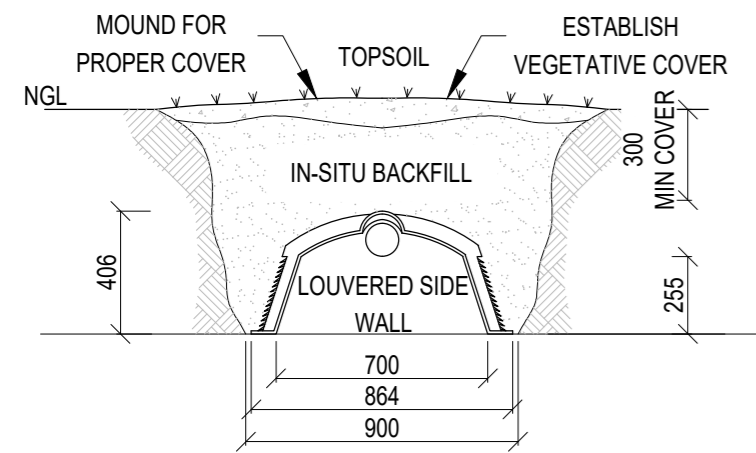
TYPICAL SYMMETRICAL V-DRAIN DETAIL

1:25



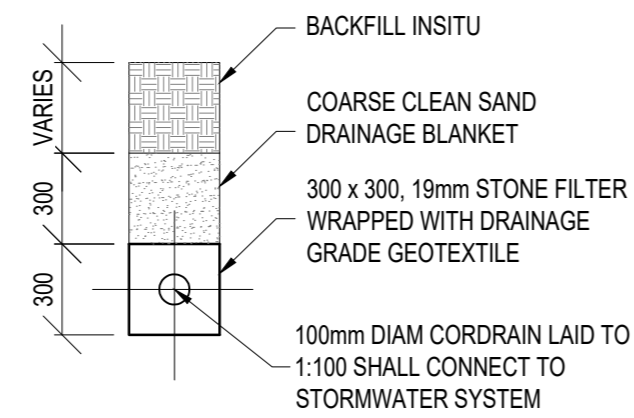
CONTRACTION JOINT DETAIL

1:10



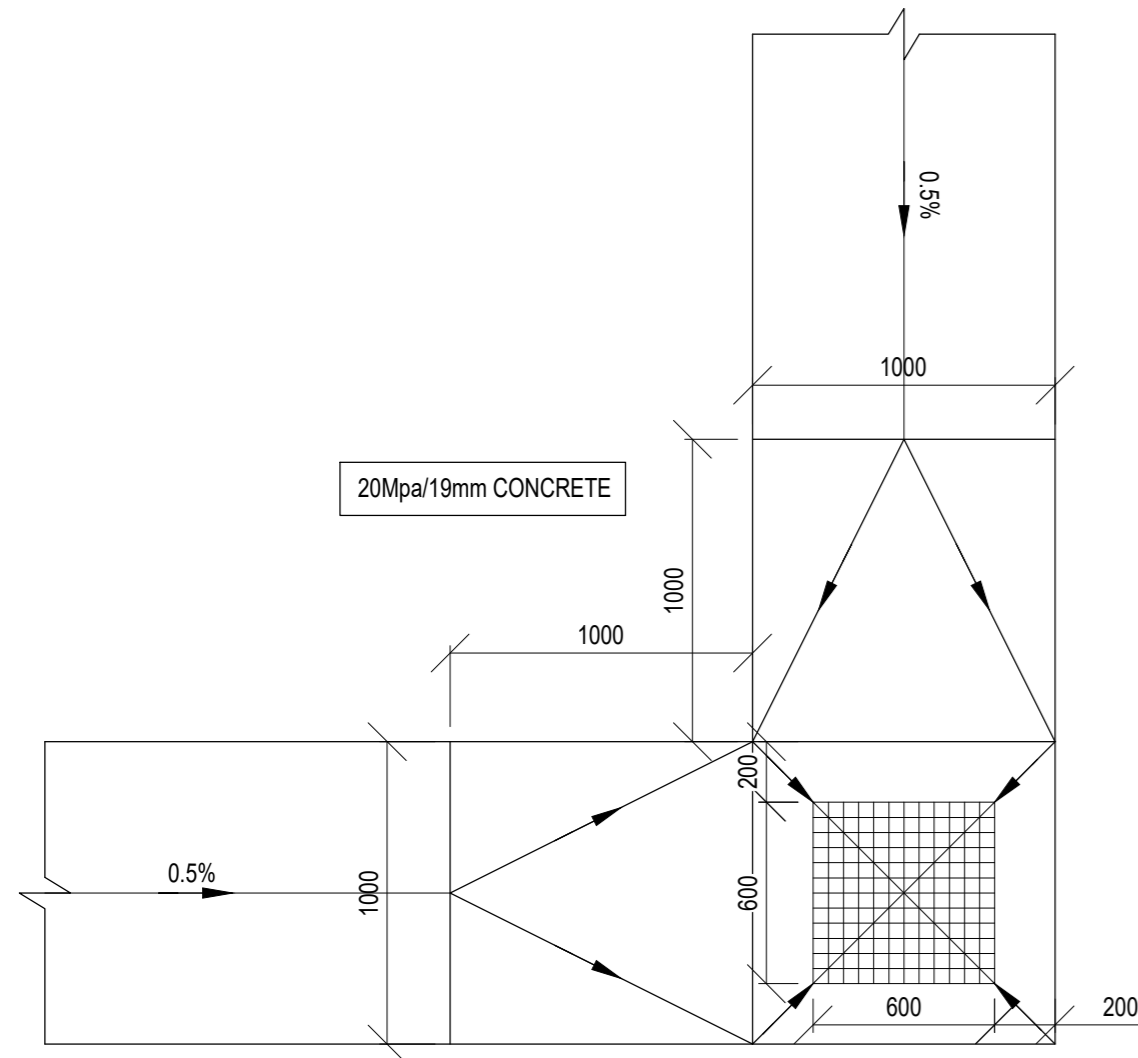
INFILTRATOR CHAMBER (KAYTECH OR APPROVED SIMILAR)

1:25



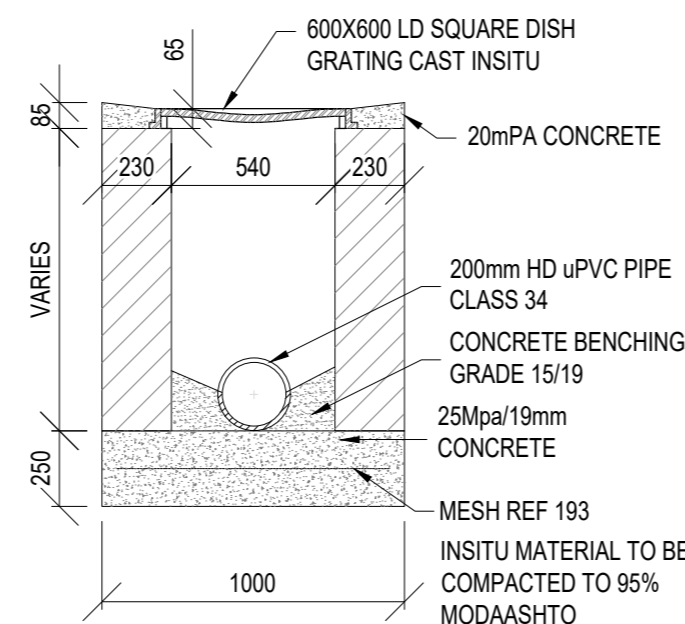
TYPICAL SUBSOIL DRAIN DETAIL

1:25



TYPICAL CHANNEL TRANSITION

1:25

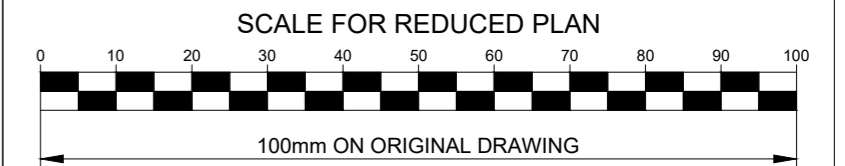


SECTION THROUGH MANHOLE

1:25

GENERAL NOTES:

- ALL WORK IN ACCORDANCE WITH THE RELEVANT SECTIONS OF SANS 1200.
- ALL DIMENSIONS AND LEVELS TO BE CHECKED ON SITE PRIOR TO CONSTRUCTION. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
- ALL EXISTING SERVICES TO BE CHECKED & CONFIRMED ON SITE PRIOR TO CONSTRUCTION. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
- DRAWINGS TO BE READ IN CONJUNCTION WITH THE ARCHITECTS DRAWINGS.
- FOUNDATION EXCAVATIONS TO BE APPROVED BY THE STRUCTURAL / GEOTECHNICAL ENGINEER.
- REINFORCING TO BE CHECKED BY THE ENGINEER.
- ALL DUCTS OR RECESSES TO BE APPROVED BY THE ENGINEER.
- POSITION OF CONSTRUCTION JOINTS TO BE APPROVED BY THE ENGINEER.
- CONCRETE STRENGTHS @ 28 DAYS:
BLINDING : 15 MPa
BASES : 25 MPa
PILECAPS : 25 MPa
FOOTINGS : 25 MPa
COLUMNS : 30 MPa
SLABS : 30 MPa
BEAMS : 30 MPa
WALLS : 25 MPa
- COVER TO STEEL REINFORCING:
SLABS : 25mm
BEAMS : 30mm
COLUMNS : 30mm
PILECAPS : 75mm
FOUNDATIONS : 50mm
GROUND BEAMS : 50mm
- STRIPPING OF FORMWORK:
SLABS : 10 DAYS
BEAMS : 14 DAYS
CUBE RESULTS TO BE APPROVED PRIOR TO STRIPPING OF FORMWORK.
- ALL SHARP EXPOSED EDGES TO BE CHAMFERED 25 x 25mm. ALL EXPOSED CONCRETE SURFACES SHALL HAVE AN OFF-SHUTTER FINISH.
- ALL WATERPROOFING TO ARCHITECTS DETAIL.
- SAW CUTS ARE TO BE MADE AS SOON AS THE CONCRETE IS FIRM ENOUGH NOT TO BE TORN OR DAMAGED BY THE CUTTING BLADE (USUALLY BETWEEN 8 TO 16 HOURS AFTER CASTING).



COPYRIGHT

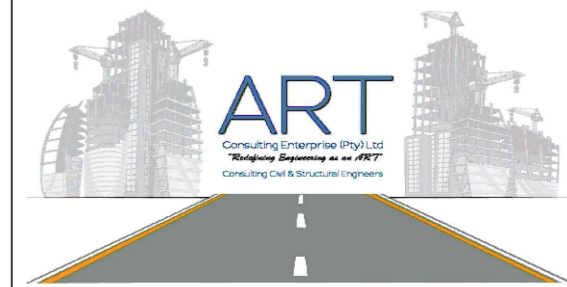
ART Consulting Enterprise (Pty) Ltd retains the copyright in all intellectual property, including designs and/or documents prepared in terms of this appointment for the project covered by the appointment. The client may use the designs and/or documents for the sole purpose of their intended use on this project only subject to payment for the design having been received. Use for any other purpose, whether or not the design and/or documents have been paid for constitutes an infringement of copyright, and all rights are reserved

FOR TENDER

FEBRUARY 2023

REVISION INFORMATION

DATE	DESCRIPTION	REV
2021.04.05	FOR APPROVAL	0
2023.02.17	FOR TENDER	0.1



15 Jennifer Avenue,
Queensburgh,
Durban,
4093
Cell: +27 (0) 83 743 9857
Email: reshay@artce.co.za

DESIGNED	DRAWN	CHECKED
R.TAKOORDEEN	R.TAKOORDEEN	R.TAKOORDEEN

MR R TAKOORDEEN

PR NO: 2019300663
PR TECH ENG

PROJECT

**IMFOLOZI GAME RESERVE
MPILA CAMP**

DRAWING DESCRIPTION

**PROJECT SPECIFIC TYPICAL
DETAILS**

SCALE ON A2
AS SHOWN

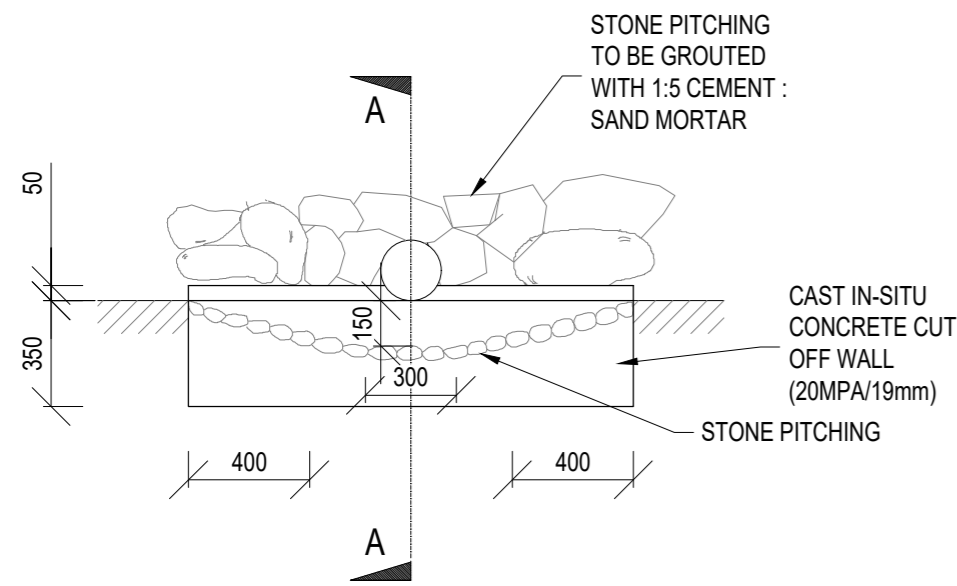
DATE DRAWN
2021.04.06

DRAWING NUMBER

033-CI-001-001-0.1

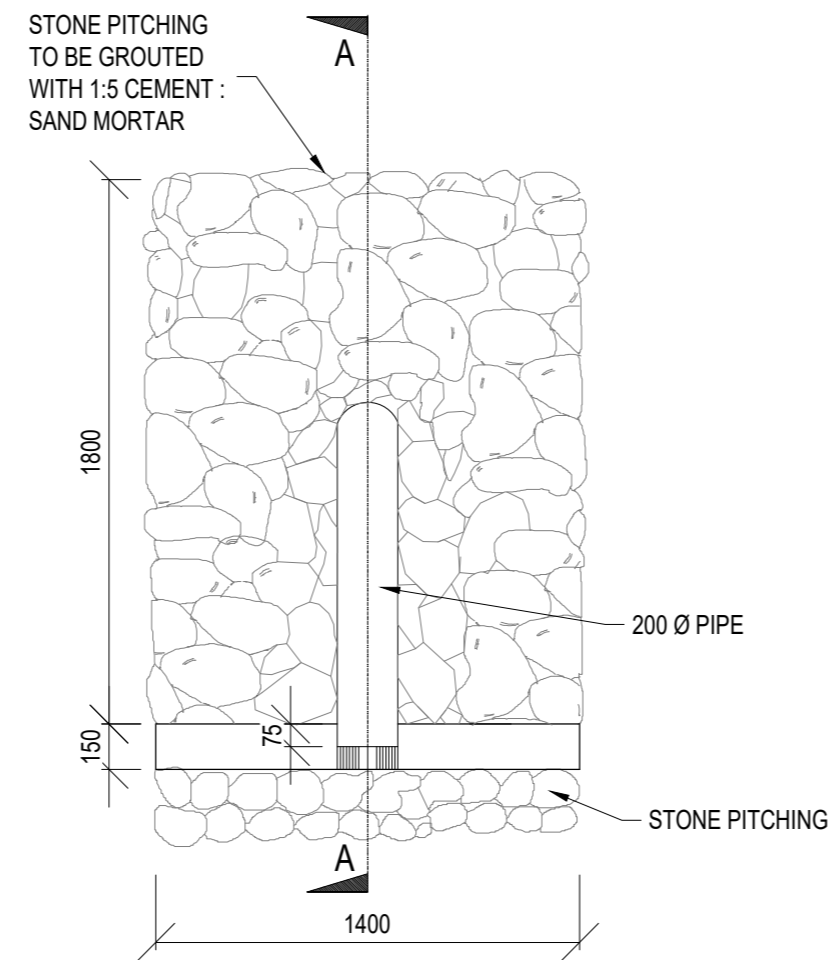
REVISION

0.1



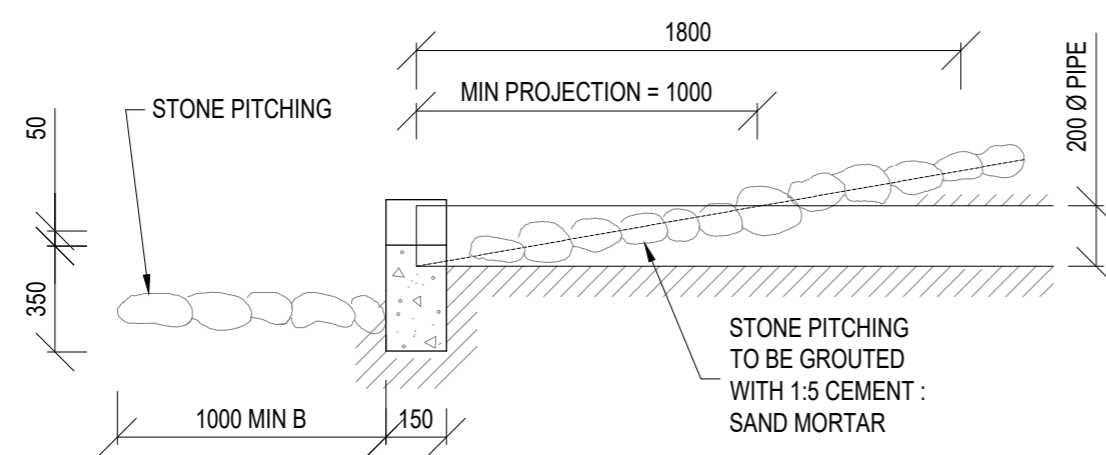
FRONT ELEVATION OF STONE PITCHED HEADWALL

1:25



PLAN OF STONE PITCHED HEADWALL

1:25

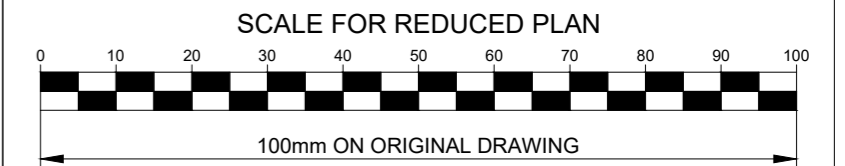


SECTION A-A

1:25

GENERAL NOTES:

- ALL WORK IN ACCORDANCE WITH THE RELEVANT SECTIONS OF SANS 1200.
- ALL DIMENSIONS AND LEVELS TO BE CHECKED ON SITE PRIOR TO CONSTRUCTION. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
- ALL EXISTING SERVICES TO BE CHECKED & CONFIRMED ON SITE PRIOR TO CONSTRUCTION. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
- DRAWINGS TO BE READ IN CONJUNCTION WITH THE ARCHITECTS DRAWINGS.
- FOUNDATION EXCAVATIONS TO BE APPROVED BY THE STRUCTURAL / GEOTECHNICAL ENGINEER.
- REINFORCING TO BE CHECKED BY THE ENGINEER.
- ALL DUCTS OR RECESSES TO BE APPROVED BY THE ENGINEER.
- POSITION OF CONSTRUCTION JOINTS TO BE APPROVED BY THE ENGINEER.
- CONCRETE STRENGTHS @ 28 DAYS:
 BLINDING : 15 MPa
 BASES : 25 MPa
 PILECAPS : 25 MPa
 FOOTINGS : 25 MPa
 COLUMNS : 30 MPa
 SLABS : 30 MPa
 BEAMS : 30 MPa
 WALLS : 25 MPa
- COVER TO STEEL REINFORCING:
 SLABS : 25mm
 BEAMS : 30mm
 COLUMNS : 30mm
 PILECAPS : 75mm
 FOUNDATIONS : 50mm
 GROUND BEAMS : 50mm
- STRIPPING OF FORMWORK:
 SLABS : 10 DAYS
 BEAMS : 14 DAYS
 CUBE RESULTS TO BE APPROVED PRIOR TO STRIPPING OF FORMWORK.
- ALL SHARP EXPOSED EDGES TO BE CHAMFERED 25 x 25mm. ALL EXPOSED CONCRETE SURFACES SHALL HAVE AN OFF-SHUTTER FINISH.
- ALL WATERPROOFING TO ARCHITECTS DETAIL.
- SAW CUTS ARE TO BE MADE AS SOON AS THE CONCRETE IS FIRM ENOUGH NOT TO BE TORN OR DAMAGED BY THE CUTTING BLADE (USUALLY BETWEEN 8 TO 16 HOURS AFTER CASTING).



COPYRIGHT

ART Consulting Enterprise (Pty) Ltd retains the copyright in all intellectual property, including designs and/or documents prepared in terms of this appointment for the project covered by the appointment. The client may use the designs and/or documents for the sole purpose of their intended use on this project only subject to payment for the design having been received. Use for any other purpose, whether or not the design and/or documents have been paid for constitutes an infringement of copyright, and all rights are reserved

FOR TENDER

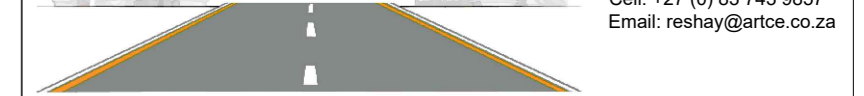
FEBRUARY 2023

REVISION INFORMATION

DATE	DESCRIPTION	REV
2022.03.09	FOR APPROVAL	Ø
2023.02.17	FOR TENDER	0.1



15 Jennifer Avenue,
 Queensburgh,
 Durban,
 4093
 Cell: +27 (0) 83 743 9857
 Email: reshay@artce.co.za



DESIGNED	DRAWN	CHECKED
R.TAKOORDEEN	R.TAKOORDEEN	R.TAKOORDEEN

MR R TAKOORDEEN	PR NO: 2019300663 PR TECH ENG
-----------------	----------------------------------

PROJECT

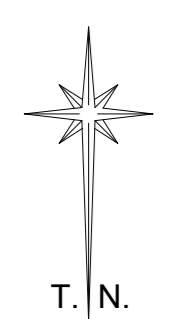
**IMFOLOZI GAME RESERVE
 MPILA CAMP**

DRAWING DESCRIPTION

**TYPICAL STONE PITCHED
 HEADWALL DETAILS**

SCALE ON A2 AS SHOWN	DATE DRAWN 2021.04.06
-------------------------	--------------------------

DRAWING NUMBER 033-CI-001-002-0.1	REVISION 0.1
---	------------------------



LEGEND

- S1.1, S1.2: PROPOSED STANDARD 1m PRECAST RING MANHOLES & 160mm Ø HD uPVC SEWER PIPE
- SW1.1, SW1.2: PROPOSED STANDARD 1.2m BRICK MANHOLE/SUMP & 200mm Ø HD uPVC STORMWATER PIPE
- NEW BLOCKS
- NEW V-DRAINS
- NEW RETAINING WALLS
- EXISTING BUILDINGS
- BUILDINGS TO BE DEMOLISHED

CHANNEL SETTING OUT

CODE	Y	X	Z
C1	-84381.198	3133182.482	296.40m
C2	-84385.093	3133186.489	296.45m
C3	-84388.987	3133190.496	296.40m
C4	-84403.150	3133188.940	296.35m
C5	-84423.755	3133141.099	296.40m
C6	-84427.649	3133145.106	296.45m
C7	-84431.543	3133149.113	296.40m
C8	-84409.592	3133162.655	296.35m

PLATFORM SETTING OUT DATA

CODE	Y	X	Z
P1.1	-84377.66	3133182.007	296.50m
P1.2	-84423.393	3133137.570	296.50m
P1.3	-84435.062	3133149.586	296.50m
P1.4	-84389.361	3133194.037	296.50m

STORMWATER SETTING OUT DATA

CODE	Y	X	CL	IL	DEPTH (m)	PIPE Ø
SW1.1	-84407.030	3133172.933	296.30	295.50	0.80	200mm Ø
SW1.2	-84407.143	3133165.984	296.50	295.41	1.10	200mm Ø
SW1.3	-84402.771	3133161.504	296.50	295.33	1.20	200mm Ø
SW1.4	-84382.574	3133140.813	293.93	292.73	1.20	200mm Ø
SW1.5	-84383.578	3133115.65	(TBC)	(TBC)	(TBC)	200mm Ø
SW1.6	-84402.935	3133066.681	(TBC)	(TBC)	(TBC)	200mm Ø

STORMWATER PIPE LENGTHS

STORMWATER LINE	LENGTH	GRADE
SW1.1 TO SW1.2	1.70m	1:80
SW1.2 TO SW1.3	6.26m	1:80
SW1.3 TO SW1.4	29.00m	1:11
SW1.4 TO SW1.5	25.20m	TBC
SW1.5 TO SW1.6	53.00m	TBC

STORMWATER SETTING OUT DATA

CODE	Y	X	CL	IL	DEPTH (m)	PIPE Ø
SW2.1	-84399.270	3133164.947	296.30	295.50	0.80	200mm Ø
SW1.3	-84402.771	3133161.504	296.50	295.33	1.20	200mm Ø

STORMWATER PIPE LENGTHS

STORMWATER LINE	LENGTH	GRADE
SW2.1 TO SW1.3	4.90m	1:12

STORMWATER SETTING OUT DATA

CODE	Y	X	CL	IL	DEPTH (m)	PIPE Ø
SW3.1	-84413.486	3133166.662	296.30	295.50	0.80	200mm Ø
SW1.2	-84407.143	3133165.984	296.50	295.41	1.10	200mm Ø

STORMWATER PIPE LENGTHS

STORMWATER LINE	LENGTH	GRADE
SW3.1 TO SW1.2	6.40m	1:70

STORMWATER SETTING OUT DATA

CODE	Y	X	CL	IL	DEPTH (m)	PIPE Ø
SW4.1	-84405.712	3133158.662	296.30	295.50	0.80	200mm Ø
SW1.3	-84402.771	3133161.504	296.50	295.33	1.20	200mm Ø

STORMWATER PIPE LENGTHS

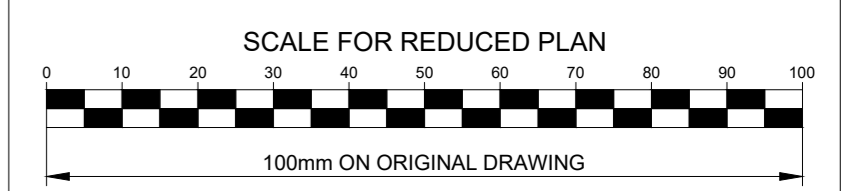
STORMWATER LINE	LENGTH	GRADE
SW3.1 TO SW4.1	4.10m	1:24

SEWER SETTING OUT DATA

CODE	Y	X	CL	IL	DEPTH (m)	PIPE Ø
S1.1	-84399.286	3133162.812	296.50	295.70	0.80	160mm Ø
S1.2	-84379.991	3133142.966	293.95	292.95	1.00	160mm Ø
S1.3	-84379.714	3133137.773	293.53	292.83	0.70	160mm Ø
S1.4	-84377.534	3133096.830	TBC	TBC	TBC	110mm Ø

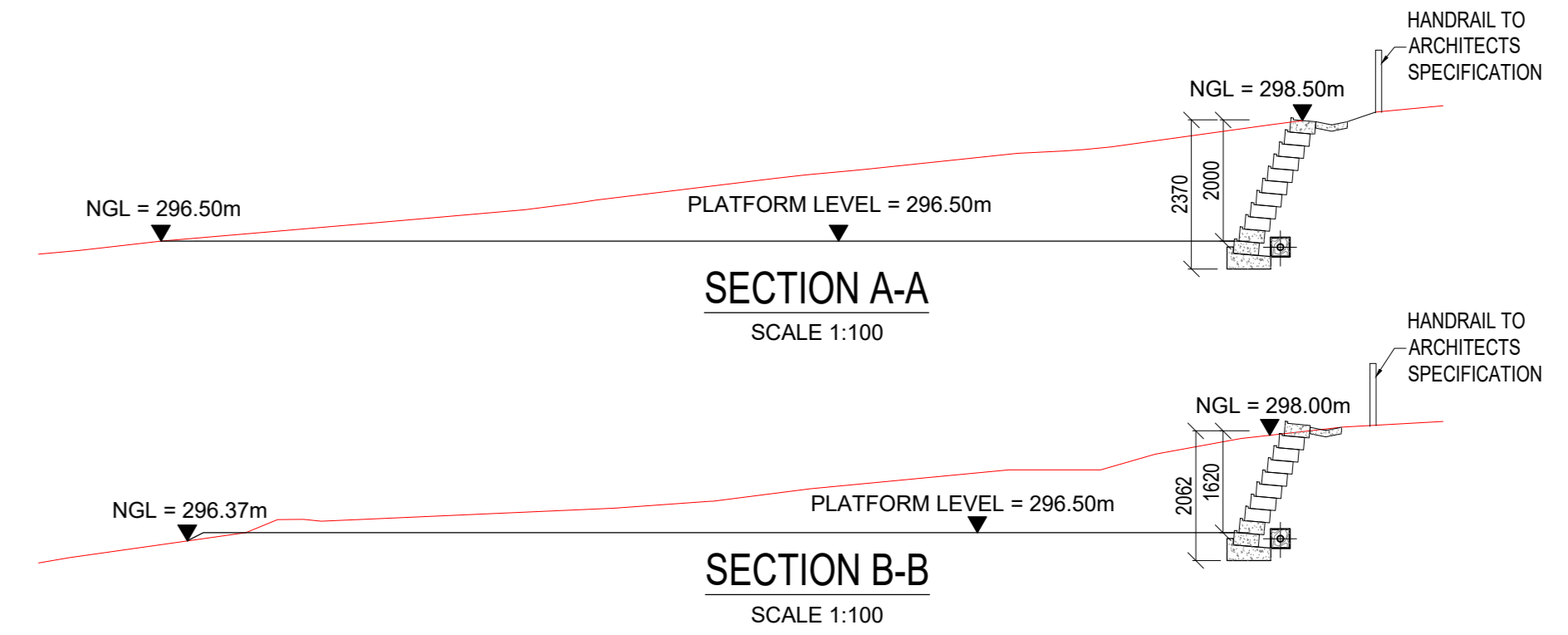
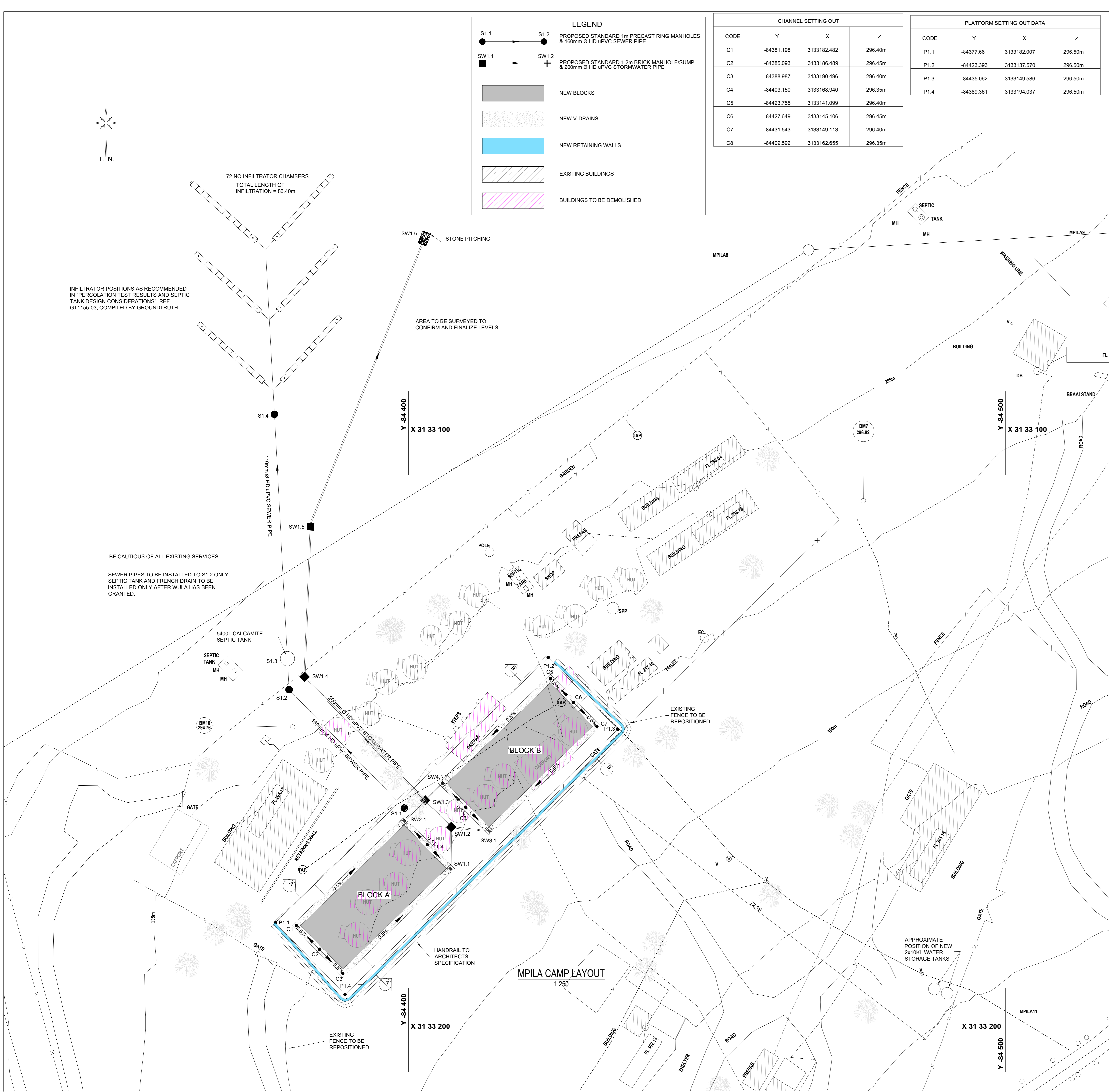
SEWER PIPE LENGTHS

SEWER LINE	LENGTH	GRADE
S1.1 TO S1.2	27.70m	1:10
S1.2 TO S1.3	5.20m	1:43
S1.3 TO S1.4	41.00m	TBC



SCALE FOR REDUCED PLAN
100mm ON ORIGINAL DRAWING

- GENERAL NOTES:**
- ALL WORK IN ACCORDANCE WITH THE RELEVANT SECTIONS OF SANS 1200.
 - ALL DIMENSIONS AND LEVELS TO BE CHECKED ON SITE PRIOR TO CONSTRUCTION. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
 - ALL EXISTING SERVICES TO BE CHECKED & CONFIRMED ON SITE PRIOR TO CONSTRUCTION. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
 - DRAWINGS TO BE READ IN CONJUNCTION WITH THE ARCHITECTS DRAWINGS.
 - FOUNDATION EXCAVATIONS TO BE APPROVED BY THE STRUCTURAL / GEOTECHNICAL ENGINEER.
 - REINFORCING TO BE CHECKED BY THE ENGINEER.
 - ALL DUCTS OR RECESSES TO BE APPROVED BY THE ENGINEER.
 - POSITION OF CONSTRUCTION JOINTS TO BE APPROVED BY THE ENGINEER.
 - CONCRETE STRENGTHS @ 28 DAYS:
BLINDING : 15 MPa
BASES : 25 MPa
PILECAPS : 25 MPa
FOOTINGS : 25 MPa
COLUMNS : 30 MPa
SLABS : 30 MPa
BEAMS : 30 MPa
WALLS : 25 MPa
 - COVER TO STEEL REINFORCING:
SLABS : 25mm
BEAMS : 30mm
COLUMNS : 30mm
PILECAPS : 75mm
FOUNDATIONS : 50mm
GROUND BEAMS : 50mm
 - STRIPPING OF FORMWORK:
SLABS : 10 DAYS
BEAMS : 14 DAYS
CURE RESULTS TO BE APPROVED PRIOR TO STRIPPING OF FORMWORK.
 - ALL SHARP EXPOSED EDGES TO BE CHAMFERED 25 x 25mm. ALL EXPOSED CONCRETE SURFACES SHALL HAVE AN OFF-SHUTTER FINISH.
 - ALL WATERPROOFING TO ARCHITECTS DETAIL.
 - SAW CUTS ARE TO BE MADE AS SOON AS THE CONCRETE IS FIRM ENOUGH NOT TO BE TORN OR DAMAGED BY THE CUTTING BLADE (USUALLY BETWEEN 8 TO 16 HOURS AFTER CASTING).



FOR TENDER FEBRUARY 2023

REVISION INFORMATION

DATE	DESCRIPTION	REV
2021.05.17	FOR INFORMATION	0
2022.03.09	RETAINING WALL AND HEADWALL CHANGED AS PER CLIENTS REQUEST	0.1
2023.02.17	FOR TENDER	0.2



DESIGNED DRAWN CHECKED

R TAKOORDEEN	R TAKOORDEEN	R TAKOORDEEN
--------------	--------------	--------------

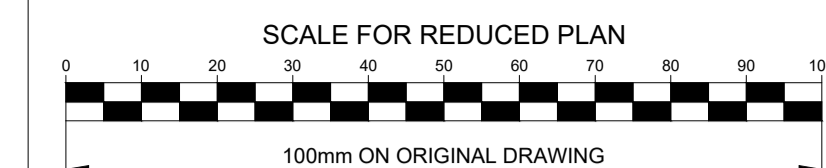
MR R TAKOORDEEN PR NO: 201930063 PR TECH ENG

PROJECT
IMFOLOZI GAME RESERVE MPILA CAMP

DRAWING DESCRIPTION
NEW BLOCK A & B 6 BEDROOM STAFF ACCOMMODATION SEWER, STORMWATER AND PLATFORM LAYOUT

SCALE ON A3 DATE DRAWN AS SHOWN DRAWING NUMBER REVISION

AS SHOWN	2021.04.07	033-CI-003-001-0.2	0.2
----------	------------	--------------------	-----



COPYRIGHT

ART Consulting Enterprise (Pty) Ltd retains the copyright in all intellectual property, including designs and/or documents prepared in terms of this appointment for the project covered by the appointment. The client may use the designs and/or documents for the sole purpose of their intended use on this project only subject to payment for the design having been received. Use for any other purpose, whether or not the design and/or documents have been paid for constitutes an infringement of copyright, and all rights are reserved.

GENERAL NOTES:

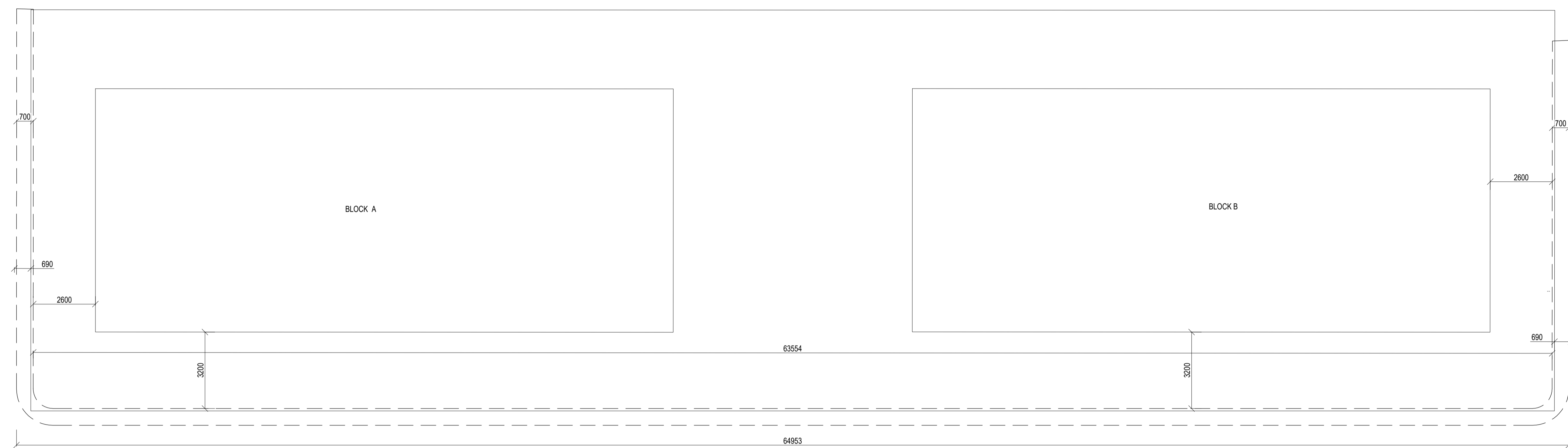
- ALL WORK IN ACCORDANCE WITH THE RELEVANT SECTIONS OF SANS 1200.
- ALL DIMENSIONS AND LEVELS TO BE CHECKED ON SITE PRIOR TO CONSTRUCTION. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
- ALL EXISTING SERVICES TO BE CHECKED & CONFIRMED ON SITE PRIOR TO CONSTRUCTION. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
- DRAWINGS TO BE READ IN CONJUNCTION WITH THE ARCHITECTS DRAWINGS.
- FOUNDATION EXCAVATIONS TO BE APPROVED BY THE STRUCTURAL / GEOTECHNICAL ENGINEER.
- REINFORCING TO BE CHECKED BY THE ENGINEER.
- ALL DUCTS OR RECESSES TO BE APPROVED BY THE ENGINEER.
- POSITION OF CONSTRUCTION JOINTS TO BE APPROVED BY THE ENGINEER.
- CONCRETE STRENGTHS @ 28 DAYS:

BLINDING	: 15 MPa
BASES	: 25 MPa
PILECAPS	: 25 MPa
FOOTINGS	: 25 MPa
COLUMNS	: 30 MPa
SLABS	: 30 MPa
BEAMS	: 30 MPa
WALLS	: 25 MPa
- COVER TO STEEL REINFORCING:

SLABS	: 25mm
BEAMS	: 30mm
COLUMNS	: 30mm
PILECAPS	: 75mm
FOUNDATIONS	: 50mm
GROUND BEAMS	: 50mm
- STRIPPING OF FORMWORK:

SLABS	: 10 DAYS
BEAMS	: 14 DAYS

 CUBE RESULTS TO BE APPROVED PRIOR TO STRIPPING OF FORMWORK.
- ALL SHARP EXPOSED EDGES TO BE CHAMFERED 25 x 25mm. ALL EXPOSED CONCRETE SURFACES SHALL HAVE AN OFF-SHUTTER FINISH.



**DRY STACK RETAINING WALL
FOUNDATION LAYOUT**
1:100

FOR TENDER FEBRUARY 2023

REVISION INFORMATION

DATE	DESCRIPTION	REV
2021.04.05	FOR APPROVAL	0
2022.03.09	RETAINING WALL CHANGES AS PER CLIENTS REQUEST	0.1
2023.02.17	FOR TENDER	0.2

DESIGNED	DRAWN	CHECKED
R.TAKOORDEEN	R.TAKOORDEEN	R.TAKOORDEEN

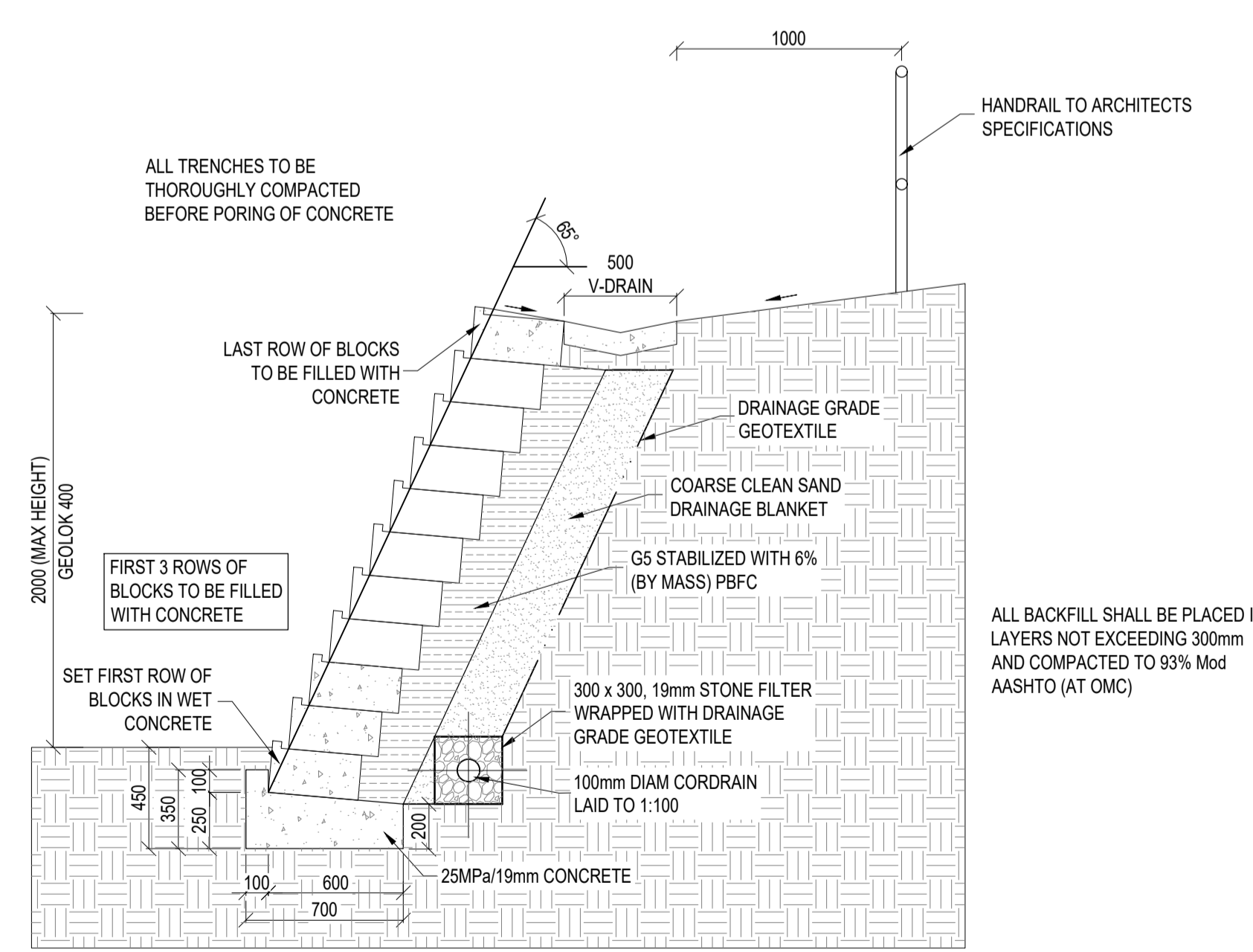
MR R TAKOORDEEN PR NO: 2019300663 PR TECH ENG

PROJECT
**IMFOLOZI GAME RESERVE
MPILA CAMP**

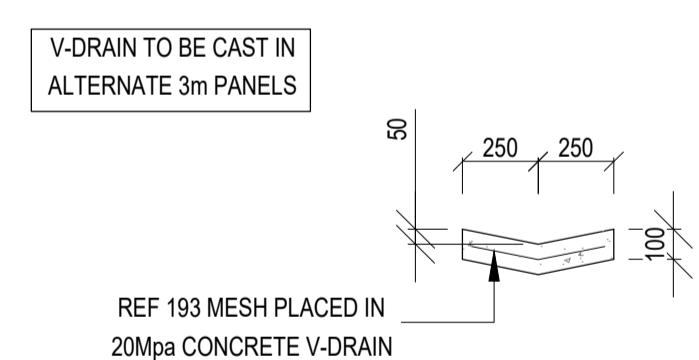
DRAWING DESCRIPTION
**NEW BLOCK A & B
6 BEDROOM STAFF
ACCOMMODATION RETAINING
WALL LAYOUT AND DETAILS**

SCALE ON A1	DATE DRAWN
AS SHOWN	2021.04.06

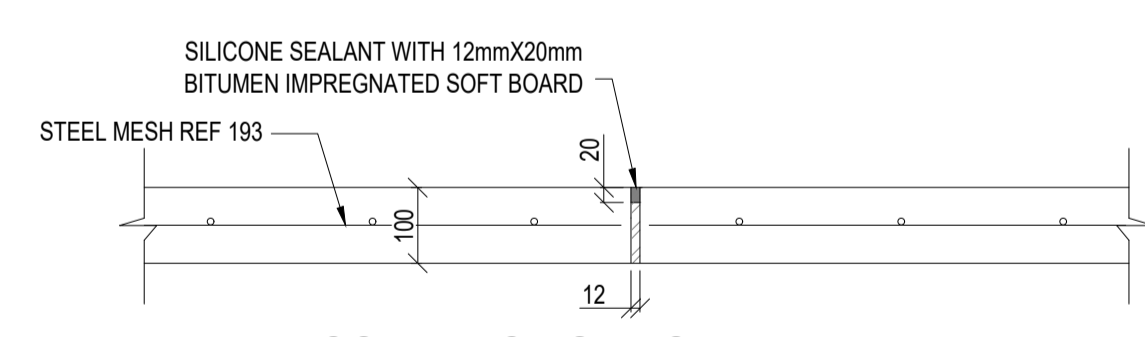
DRAWING NUMBER	REVISION
033-ST-002-001-0.2	0.2



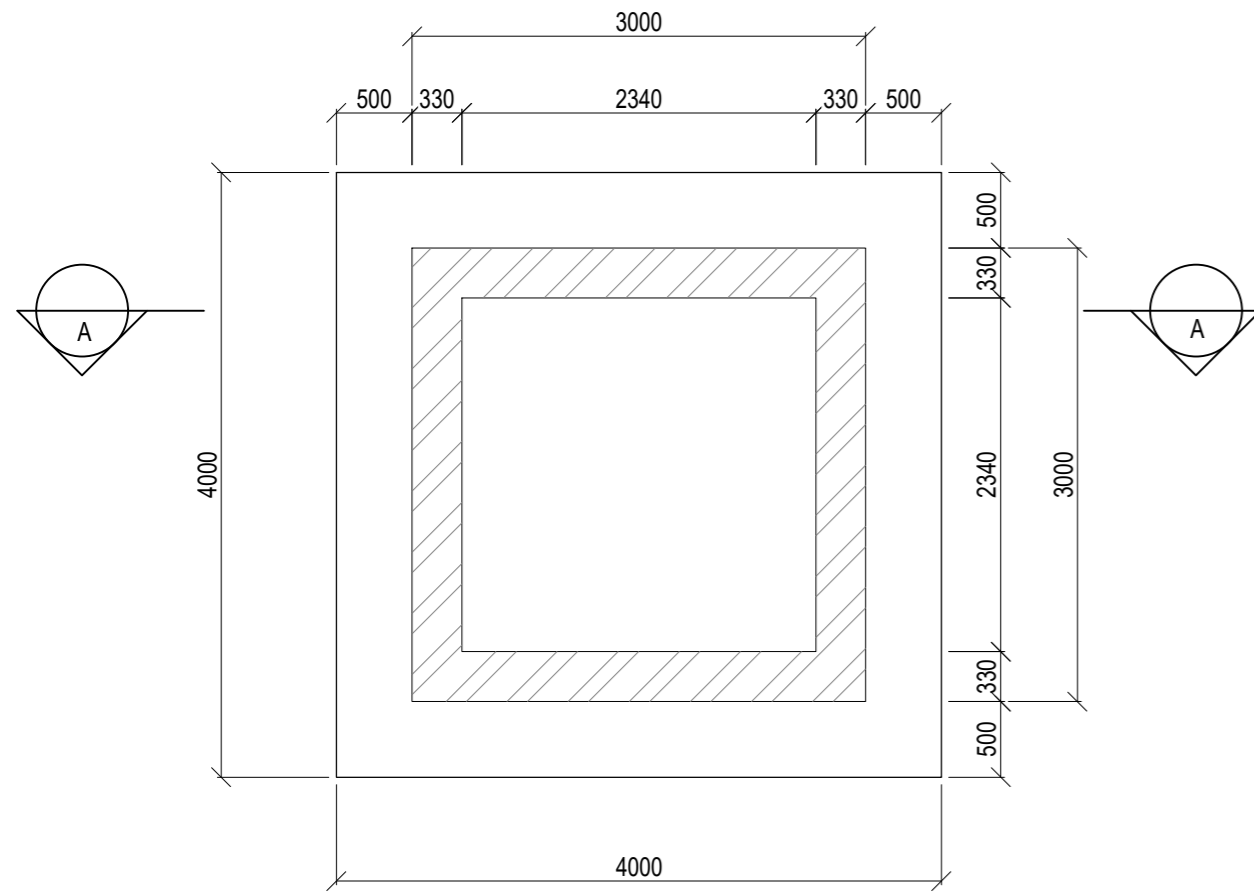
**TYPICAL SECTION THROUGH WALL
DRY STACK RETAINING WALL**
1:25



**TYPICAL SYMMETRICAL V-DRAIN DETAIL
FOR DRY STACK RETAINING WALL**
1:25

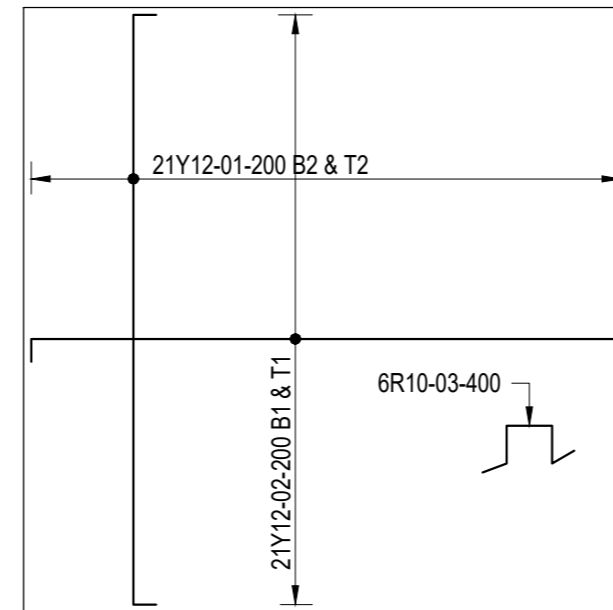


CONTRACTION JOINT DETAIL
1:10



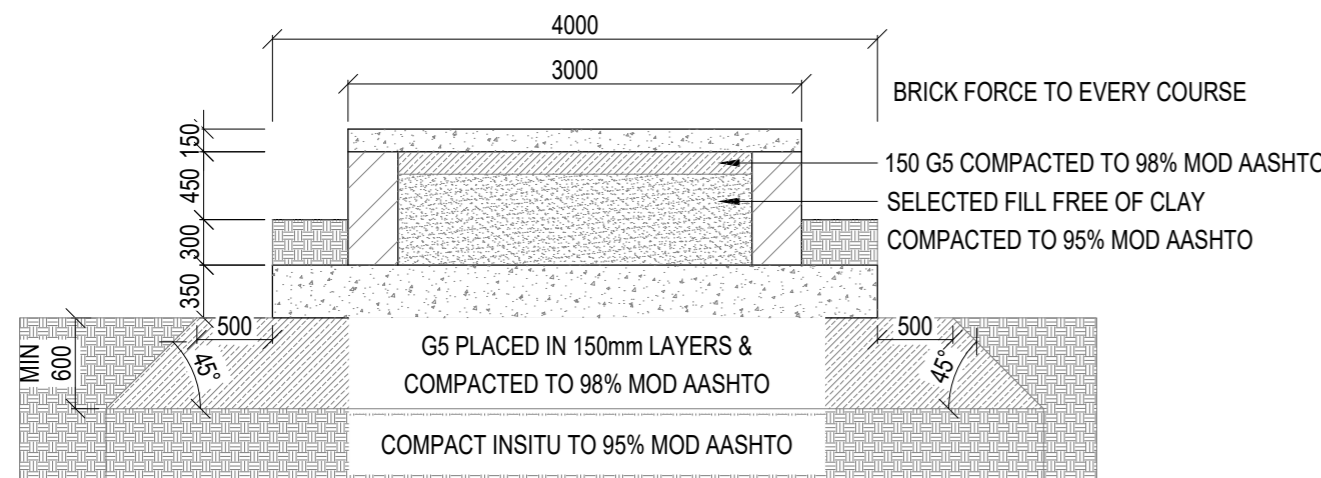
TANK STAND LAYOUT

1:50



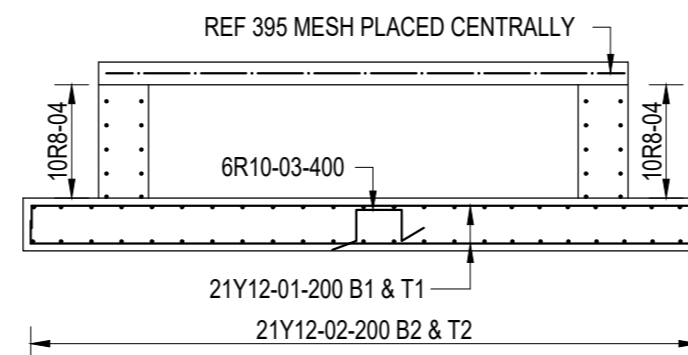
TANK STAND FOUNDATION LAYOUT

1:50



SECTION A-A

1:50



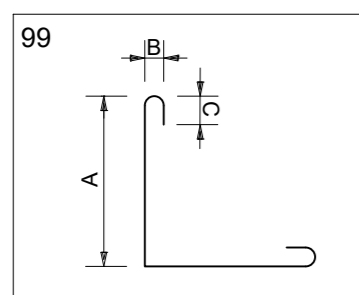
SECTION A-A (STEEL DETAIL)

1:50

BENDING SCHEDULE FOR 1 TANK STAND ONLY

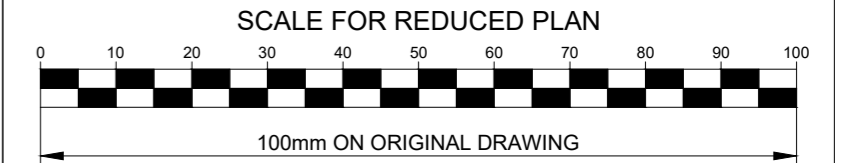
Members	Bar Mark	Type & Size	No. of Bars	No. of Mbrs	Total Bars	Cutting Length	Shape Code	A	B	C	D	E/R
TANK STAND FOUNDATION	01	Y12	42	1	42	4200	38	150	3900			
	02	Y12	42	1	42	4200	38	150	3900			
	03	R10	4	1	4	1550	83	350	200	400		
	04	R8	40	1	40	1150	99	450	50	75		

SPECIAL SHAPE CODES



GENERAL NOTES:

- ALL WORK IN ACCORDANCE WITH THE RELEVANT SECTIONS OF SANS 1200.
- ALL DIMENSIONS AND LEVELS TO BE CHECKED ON SITE PRIOR TO CONSTRUCTION. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
- ALL EXISTING SERVICES TO BE CHECKED & CONFIRMED ON SITE PRIOR TO CONSTRUCTION. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER.
- DRAWINGS TO BE READ IN CONJUNCTION WITH THE ARCHITECTS DRAWINGS.
- FOUNDATION EXCAVATIONS TO BE APPROVED BY THE STRUCTURAL / GEOTECHNICAL ENGINEER.
- REINFORCING TO BE CHECKED BY THE ENGINEER.
- ALL DUCTS OR RECESSES TO BE APPROVED BY THE ENGINEER.
- POSITION OF CONSTRUCTION JOINTS TO BE APPROVED BY THE ENGINEER.
- CONCRETE STRENGTHS @ 28 DAYS:
BLINDING : 15 MPa
BASES : 25 MPa
PILECAPS : 25 MPa
FOOTINGS : 25 MPa
COLUMNS : 30 MPa
SLABS : 30 MPa
BEAMS : 30 MPa
WALLS : 25 MPa
- COVER TO STEEL REINFORCING:
SLABS : 25mm
BEAMS : 30mm
COLUMNS : 30mm
PILECAPS : 75mm
FOUNDATIONS : 50mm
GROUND BEAMS : 50mm
- STRIPPING OF FORMWORK:
SLABS : 10 DAYS
BEAMS : 14 DAYS
CUBE RESULTS TO BE APPROVED PRIOR TO STRIPPING OF FORMWORK.
- ALL SHARP EXPOSED EDGES TO BE CHAMFERED 25 x 25mm. ALL EXPOSED CONCRETE SURFACES SHALL HAVE AN OFF-SHUTTER FINISH.
- ALL WATERPROOFING TO ARCHITECTS DETAIL.
- SAW CUTS ARE TO BE MADE AS SOON AS THE CONCRETE IS FIRM ENOUGH NOT TO BE TORN OR DAMAGED BY THE CUTTING BLADE (USUALLY BETWEEN 8 TO 16 HOURS AFTER CASTING).



COPYRIGHT

ART Consulting Enterprise (Pty) Ltd retains the copyright in all intellectual property, including designs and/or documents prepared in terms of this appointment for the project covered by the appointment. The client may use the designs and/or documents for the sole purpose of their intended use on this project only subject to payment for the design having been received. Use for any other purpose, whether or not the design and/or documents have been paid for constitutes an infringement of copyright, and all rights are reserved

FOR TENDER

FEBRUARY 2023

REVISION INFORMATION

DATE	DESCRIPTION	REV
2021.04.07	FOR APPROVAL	Ø
2023.02.17	FOR TENDER	0.1



15 Jennifer Avenue,
Queensburgh,
Durban,
4093
Cell: +27 (0) 83 743 9857
Email: reshay@artce.co.za

DESIGNED	DRAWN	CHECKED
R.TAKOORDEEN	R.TAKOORDEEN	R.TAKOORDEEN

MR R TAKOORDEEN

PR NO: 2019300663
PR TECH ENG

PROJECT

**IMFOLOZI GAME RESERVE
MPILA CAMP**

DRAWING DESCRIPTION

TANK STAND DETAIL

SCALE ON A2
AS SHOWN

DATE DRAWN
2021.04.07

DRAWING NUMBER

033-ST-003-001-0.1

REVISION

0.1

**NEW 2 X 6 BED STAFF ACCOMMODATION UNITS
AT MPILA CAMP IMFOLOZI GAME RESERVE**



**PART D2:
SPECIFICATIONS**

**NEW 2 X 6 BED STAFF ACCOMMODATION UNITS
AT MPILA CAMP IMFOLOZI GAME RESERVE**



**PART D2.1:
BUILDING WORKS SPECIFICATIONS**

STANDARD PREAMBLES TO ALL TRADES

INDEX	<i>Page</i>
ALTERATIONS	SP2
EARTHWORKS	SP2
CONCRETE, FORMWORK AND REINFORCEMENT	SP6
BRICKWORK	SP16
WATERPROOFING	SP19
ROOF COVERINGS	SP20
CARPENTRY AND JOINERY	SP21
FLOOR COVERINGS, PLASTIC LININGS, ETC	SP29
IRONMONGERY	SP30
STRUCTURAL STEELWORK	SP31
METALWORK	SP33
PLASTERING	SP39
TILING	SP41
DRAINAGE AND PLUMBING	SP42
GLAZING	SP51
PAINTING	SP51
ROADWORK	SP53
FENCING AND GATES	SP58
SUBMISSIONS FOR PREFABRICATED TIMBER ROOF TRUSSES	SP65
HEAVY DUTY ROAD WORK	SP66

NOTE

Only those clauses or portions of clauses in the following preambles which refer to items in the Bills of Quantities shall be considered as applying to the performance of this Contract.

ALTERATIONS

VISIT SITE: - Tenderers are advised to visit the site prior to tendering and satisfy themselves as to the nature and extent of the work to be done, also to examine the condition of all existing buildings as no claim will be entertained on the grounds of ignorance of the conditions under which the work was to be executed.

MATERIALS FROM THE ALTERATIONS: - unless otherwise stated, will become the property of the Contractor and all these materials, together with all rubbish and debris must be carried away and the site left clean and unencumbered.

Items described as "removed" shall mean removed from the site.

Credit for the value of materials from the alterations is to be allowed for on the Summary/ Final Summary page.

Items described as to be re-used or to be handed over to the Administration are to be dismantled where necessary and stacked on site where directed, and the Contractor will be responsible for their removal and storage until required, and shall make good all items missing, damaged or broken at his own expense.

Unless otherwise described, no materials from the alterations shall be re-used in any new work without the written approval of the Director.

Prior to the removal of any timbers from the site, these are to be inspected by Government Entomologists. If any of these timbers are infested by wood destroying agencies, these timbers are to be disposed of in the manner prescribed by the Government Entomologist.

In taking down and removing existing work, particular care must be taken to avoid any structural or other damage to the remaining portions of the buildings.

NOTICE OF DISCONNECTIONS: -The Contractor is to give ample notice to the Director and Local Authorities regarding any disconnections necessary prior to the removal or interruption of electrical or telephone cables, water supply and sanitary services, etc.

DUST: -The Contractor is to allow in his rates for taking all precautions necessary to prevent any nuisance from dust whilst carrying out the works.

SHORING: - Rates for shoring are to include for the use and waste of all props, needles, wedges, braces, nails and screws, etc., required and for all cutting, notching, framing and fitting, maintaining in position for the required periods and removing at completion. All shoring is to be executed in a manner approved by the Director.

MATCHING EXISTING WORK: -The terms "make good" or "making good" to existing work as described in the items shall mean making good with materials to match, all joined to existing.

FORMING NEW OPENINGS, ETC., IN EXISTING WALLS: -Rates for items of forming new or altering existing openings are, unless otherwise stated, to include for the following: -

(a) Breaking out for and inserting adequate lintels over the new openings (except where stated in the items as being below an existing beam, slab or lintel), to the approval of the Director. The lintels are to be of in-situ concrete Class C, or of pre cast prestressed concrete or of brickwork in 1 : 3 cement mortar, with a minimum bearing of 230 mm at each end and suitably reinforced, and rates are to include for all necessary formwork, turning pieces, etc., and for wedging and pinning up to existing brickwork over in 1 : 3 cement mortar.

(b) All shoring and propping required.

(c) Facing up jambs in new brickwork in cement mortar properly bonded to existing.

(d) Building up the portions of the openings stated in the items in new brickwork in cement mortar properly bonded to existing.

(e) Formwork for concrete cills and thresholds where required.

(f) Making good only to the finishes as stated in the items. (Note: - The making good of paint finishes has been measured separately).

(g) Forming rounded angles, throats on external plastered soffits, mitres, etc., where required in all new plaster, render and granolithic finishes.

The supply, building in, fixing, etc., of all windows, doors, frames, etc., to the newly formed openings and the removal of all existing windows, doors, frames, etc., from openings to be altered, have been elsewhere measured.

EARTHWORKS

SITE CLEARANCE: - The item given in the Bills of Quantities for site clearance shall be deemed to include the removal from the site, or burning if permitted by the Local Authority, of shrubs and trees with trunks under 200 mm girth measured at 1 m above ground level, hedges, bushes, other vegetation, rubbish and debris.

Holes left by roots are to be backfilled with earth and rammed.

EXCAVATIONS: - Rates for excavations are to include for forming and trimming to the correct levels, falls, slopes, curves, etc., for trimming sides, stepping, levelling and ramming bottoms, staging and disposing of the excavated

material as described in the items. Rates for excavations to reduce levels over site are also to include for forming and trimming banks to the required batter. The Contractor is to allow in his rates for the bulking of excavated material.

The term "excavate", unless otherwise stated, shall mean excavate in "soft excavation" as defined below and for the purpose of classifying excavations the following will apply: -

- (a) Soft excavation: - shall be excavation in material that can be efficiently removed by a backacting excavator of flywheel power approximately 0,10 kW per millimetre of tined-bucket width without the assistance of pneumatic tools such as paving breakers, or that can be efficiently loaded without prior ripping or stockpiling by a rubber tyred front-end loader of approximately 15 t mass and a flywheel power of approximately 100 kW.
- (b) Intermediate excavation: - shall be excavation in material that requires a back-acting excavator of flywheel power exceeding 0,10 kW per millimetre of tined-bucket width and the assistance of pneumatic tools prior to removal by equipment equivalent to that specified in (a) above.
- (c) Hard rock excavation: - shall be excavation in material that cannot be efficiently removed without blasting or without wedging and splitting prior to removal.
- (d) Class A Boulder excavation: - shall be excavation in material containing more than 40% by volume of boulders of size between 0,03 m³ and 20 m³ in a matrix of softer material or smaller boulders. *Note:* - Excavation of solid boulders or lumps of size exceeding 20 m³ will be classed as hard rock excavation. (2) Excavation of fissured or fractured rock will not be classed as boulder excavation but as hard rock or intermediate excavation according to the nature of the material.
- (e) Class B Boulder excavation: - shall be excavation of boulders only in a material containing 40% or less by volume of boulders of size between 0,03 m³ and 20 m³ in a matrix of softer material or smaller boulders. *Note:* - Those boulders requiring individual drilling and blasting in order to be loaded by a back-acting excavator as specified in (a) above, or by a track type front-end loader, will each be separately measured as Class B boulder excavation. The excavation of the rest of the material will be classed as soft or intermediate excavation according to the nature of the material.

Method of Classifying: - The Contractor may use any method he chooses to excavate any class of material but his chosen method of excavation shall not determine the classification of the excavation. The Director will decide on the classification of the materials. The classification will be based on inspection of the material to be excavated and the criteria given in (a) to (e) above, as applicable. The decision of the Director shall, subject to the relevant provisions of the contract, be final and binding.

Should the Contractor consider that the excavation is other than "soft excavation" he must notify the Director immediately in order that an inspection be made and a decision arrived at by the Director as to the category of such excavation. Should the Contractor fail to give such notification, the excavation shall be deemed to be "soft excavation" and shall be measured and valued accordingly.

Blasting will only be permitted with the written authority of the Director, if and when permission is granted, it is to be executed only by persons holding the necessary Government Blasting Certificate and subject to all regulations imposed by the Director and/or Local Authority. In addition, the Contractor is to indemnify the Provincial Administration against all claims in respect of damage to persons and property resulting from such blasting operations.

Before commencing any excavations, the Contractor must satisfy himself as to the accuracy of any levels indicated on the drawings, as no claim will be entertained at a later date for any alleged inaccuracy in such levels.

Excavations shall be carried down to such depths as are necessary to obtain firm foundations, but before proceeding to greater depths than are shown on the drawings the Director's approval must be obtained.

The Contractor will be responsible if he excavates wider or deeper than shown or required. If the excavations are deeper than shown or required such extra excavations are to be filled in with mass concrete at the Contractor's expense. If the excavations are wider than shown or required, any form-work or mass concrete filling required to the side of the concrete foundations is to be executed at the Contractor's expense and to the approval of the Director.

Depths of excavations as approved shall be checked and recorded by the Works Supervisor or Inspector of Works and the Contractor's Foreman before any concrete is laid or the excavations are otherwise covered or filled in.

Notwithstanding such approval, any excavations which become waterlogged or otherwise spoilt after approval, shall be cleaned out and reformed, at the Contractor's expense and to the satisfaction of the Director, before any concrete, etc., is laid.

WATER: - The Contractor shall keep all excavations free from water or mud by pumping, baling or otherwise.

WORKING SPACE: - The Contractor is to allow against the items of "excavate to provide working space" for excavating beyond the extent of the net excavations measured to provide the necessary working space for the carrying out of such work as is described in the items. Rates are to include, in addition to the extra excavation, for any additional risk of collapse so incurred and for filling back and compacting the excavated material.

No separate item for working space is provided or will be considered where the face of the measured excavation is 750 mm or more away from the finished face of the structure. Separate items for working space for the building of brick foundation walls on ordinary concrete wall footings will not be considered.

In the case of column base and pile cap excavations, where the dimensions between the column face and the excavation face is less than 500 mm, working space has been measured for the width of the column face from the

commencing level of excavation to the top of the column base or pile cap only where the top of the column base or pile cap exceeds 1,5 m below the commencing level of excavation.

RISK OF COLLAPSE: -The Contractor shall maintain all excavated faces affecting the safety of the works and workmen.

He must either provide all necessary temporary planking, strutting or shoring to all vertical excavated faces or carry the risk of collapse of these faces with all its implications. He must assume full responsibility in this connection and must allow in his rates accordingly.

In addition, all excavated faces exceeding 1,5 m deep are to be maintained in accordance with Government Regulations.

Quantities reflect the total superficial areas of the vertical excavated faces and will be subject to variation only in so far as these areas may vary, notwithstanding whether any temporary supports are used or not.

FILLING, ETC.: -All backfilling and filling under floors and pavings must be of selected material from the excavations, unless otherwise stated, returned and compacted in layers as later described and with the top surface dressed to the correct levels and grades, all to the approval of the Director. Under no circumstances will the Contractor be allowed to use clay, peat or other unsuitable material for filling.

Rates for all items of filling with material from the excavations are to include for haulage not exceeding 100m from the perimeter of the excavations.

Any filling supplied by the Contractor is to be of suitable material approved by the Director.

COMPACTION OF FILLING ETC.: -All filling and backfilling is to be done in layers not exceeding 200 mm thick before compaction, with the layers level to ensure uniform compaction. Each layer is to be thoroughly compacted over the whole of the area to a dry density not less than 90 % of Mod. A.A.S.H.O. density. The surface of each compacted layer shall be uniform and tightly bonded. Care is to be taken that no damage is done to foundation walls, drains and other services.

The densities of compaction referred to are to be determined by tests carried out in accordance with A.S.T.M. Designation D 1557-58 and at a moisture content not more than 5 % above or below the Mod. A.A.S.H.O. optimum moisture content. The Contractor shall be responsible for having sufficient tests taken of the density of the compacted filling to ensure that the required compaction is being attained to the satisfaction of the Director. These tests are to be undertaken by an independent testing authority nominated by the Contractor to the approval of the Director. The costs of all tests in this connection shall be borne by the Contractor and shall be allowed for in his rates.

PROTECTION AGAINST SUBTERRANEAN WOOD-DESTROYING TERMITES: -Where protection against termites is to be provided: -

(a) Remove vegetable matter

All dead roots and other vegetable matter likely to encourage termites must be removed from the ground under, from against the building and from all filling material.

(b) Treating the ground

The ground under surface beds, and below suspended wood floors, must be treated by the application of Soil Insecticides of Chlordane or Aldrin types complying with SABS Specifications 1165 and 1164 respectively, mixed with water and applied at the rate of not less than 5 litres of solution per square metre uniformly over the whole surface. The concentration of the solution must be strictly in accordance with the manufacturer's instructions and to the approval of the Director.

The Director reserves the right to take samples of the diluted solution, at any time, in order to test the concentration of the chemicals used.

Where the ground to be treated is of earth filling, the upper 50 mm layer of filling must be levelled by raking, but must not be rammed until after the solution has been applied, and where of natural ground, it must be loosened to a depth of not less than 50 mm and similarly levelled, in order to enable the solution to penetrate into the soil. After the solution has been applied and allowed to penetrate the surface, the soil must be well rammed and consolidated.

Before applying the solution to the ground under the floors, splay back earth for a depth and width of 75 mm from the internal faces of walls enclosing the floors, against internal walls, sleeper piers, etc., and thoroughly saturate with the solution. After the solution has soaked into the earth the splayed grooves must be filled with earth and consolidated.

The treated layer of soil under suspended wood floors must be protected with a 75 mm thick layer of approved clean gravel, finished to an even surface.

The treated layer of soil under concrete surface beds must be protected with a 25 mm thick layer of well consolidated approved grit prior to laying the waterproofing membrane.

Great care must be taken when laying concrete surface beds, protective layers, etc., in order to avoid rupturing the treated layer of soil. Should the treated layer be ruptured at any point it must be made good and the area affected re-treated with the soil insecticide.

Contractors are advised that: -

(a) Special precautions must be taken to protect the workmen whilst using the soil insecticide.

(b) The treatment of filling or ground under floors shall be done as soon as practicable, so that treatment may dry out before the floors are laid.

(c) The treatment of the ground must be carried out under the supervision of the Director.

(d) The soil insecticide is to be delivered to the site in sealed drums clearly labelled or stamped with the name of the product.

- (e) In addition to the foregoing the application of the soil insecticide is to be carried out in accordance with SABS Code of Practice 0124-The application of Certain Soil Insecticides for the Protection of Buildings.
- (f) The protective layers of gravel or grit have been measured separately.

RE-USE OF EXCAVATED MATERIAL: - Material of any kind that may be discovered on the site during the excavation shall remain the property of the Administration. Such material may, if approved, be used for aggregate. Material so used shall be valued and the value deducted from the Contract Sum.

DEMOLITIONS: -The Contractor is referred to the preambles for "Alterations" insofar as they apply and the following: -The demolition of existing buildings is to be done in a practical and safe manner, under the continuous supervision of a competent Foreman. Rates for the demolition of existing buildings are to include for breaking up and removing all external screen walls, steps and ramps, surface water channels, rainwater sumps, gulleys, etc., and grubbing up and removing all foundation walls and footings, disconnecting and removing all services to a point not less than 1 m beyond the perimeter of the buildings, plugging off ends of all remaining pipes, and for filling in all holes with clean earth and ramming up to ground level. All movable fittings and furniture, fire extinguishers and electrical and other equipment in the buildings to be demolished are to remain the property of and will be removed by the Administration prior to the commencement of the demolitions.

Before commencing the demolitions the Contractor shall comply with any Local Authority regulations in force in respect of rodent extermination, etc., and he shall obtain the required Clearance Certificate. Items to cover the cost of obtaining the certificate and the fumigation, etc., of the buildings to be demolished have been provided elsewhere in the Bills of Quantities and the fumigation is to be carried out by a firm specialising in this type of work. The fumigation of the buildings to be demolished shall only be carried out if called for by the Local Authorities and if not required the value of the relevant items in the Bills of Quantities will be deducted from the Contract Sum.

After handing over the site to the Contractor, the risk of any loss or damage to the buildings to be demolished and the materials therein, caused by theft, vandalism, etc., shall be the responsibility of the Contractor and he shall take such precautions as he deems necessary against such loss or damage.

GRASS PLANTING AND TURFING: - Grass is to be "Cape Kweek" or "Umgeni" grass scientifically known as *Cynodon dactylon* or other local fine grass approved by the Director. In areas where fine grass does not grow readily Kikuyu grass *Pennisetum clandestinum* may be substituted. The areas must be identified and the approval of the Director obtained before Kikuyu grass is planted. The planting of Kikuyu grass on hockey fields is to be avoided wherever possible.

Grass Planting To Level Areas: - The areas to receive grass are to be weeded and raked free of stones and other superfluous matter and all depressions left by the earthworks plant are to be filled in with approved top soil. The planting of grass is to be carried out in continuous root planting in rows 200 mm apart. The method of planting called "sprigging" may be used as an alternative.

Immediately after completion of each strip or square the area thus grassed is to be thoroughly watered and lightly rolled. Any drifting or piling up of the top soil due to wind or any other cause must be prevented as far as possible and should such piling up of soil against newly planted grass occur the soil must immediately be raked level and lightly rolled.

Turfing: - Banks are to be carefully trimmed to an even surface and weeded and raked free of stones, etc., and all depressions filled in with approved top soil as before described. Turfing of banks is to be carried out with 25 mm thick maximum 500 x 1000mm weed-free grass sods, of grass as before described, and as approved by the Director. The grass sods are to be set in position in horizontal rows to broken bond and closely fitted together and tamped flat with a timber pummel, a maximum of two sods in every square metre of area covered being staked to the bank to maintain position, with and including one sharpened wood or bamboo skewer 250 mm long and with all cavities between sods filled in with approved top soil and the whole area lightly top soil dressed on completion.

Established Lawn: -The use of established lawn in pieces size approximately 500 x 1 000 x 25 mm thick in lieu of grass sods on banks will be permitted provided that the established lawn is supplied and laid by a firm experienced in this type of work and to the approval of the Director. The fitting, tampering, staking and top dressing must all be as described for turfing, except that one piece per square metre is required to be staked as described.

Fertilizer: -An approved fertilizer of the following types - Type 2:3:2 for grass planted levelled areas and Type 3:2:1 for turfed or established lawn covered banks is to be supplied and applied by the Contractor at the rate of 400kg per hectare. In the case of grass planted levelled areas the fertilizer is to be applied either before or after grass planting and in the case of turfed or established lawn covered banks the fertilizer is to be applied after the sods or pieces have been laid.

The fertilizer above described is in addition to any fertilizer which may have been specified to be applied during either the operation of scarifying and grading the area to be grassed or the respraying of top soil.

A sample of the existing top soil or the top soil to be respread is to be sent to an approved fertilizer manufacturer for testing and advice on the acid or alkaline content of the soil. The cost of this test is to be borne by the Contractor if this is not provided free by the fertilizer manufacturer.

The requisite quantities of limestone ammonium nitrate for acidic soil or ammonium sulphate for alkaline soil as determined by the soil test will be supplied to the Contractor by the Provincial Works Branch and the cost thereof is

included in a Provisional Sum elsewhere in these Bills of Quantities. The application of this treatment is to be undertaken by the Contractor and his rates for grassing, etc., must include for same.

Weed killer: - "Weedmaster Turfmaster" or other approved weed killer is to be applied to the entire grassed or turfed areas at a rate of 4 litres mixed with 200 litres of water per hectare, this being equivalent to 40-45 millilitres mixed with 5 litres of water per fifty square metres. The solution is to be sprayed on with a suitable spraying apparatus to achieve an even distribution. Six to eight weeks later, the operation is to be repeated. The application of weed killer is not to take place during wet weather. Weather conditions should be such as to allow a minimum of two hours for absorption before the likelihood of rain.

Watering and Rolling: -The entire turfed area is to be kept clear of weeds, lightly rolled and thoroughly watered throughout the period of the Contract and for at least three months from the time of acceptance of the grounds or until the grassing or turfing is well established if that is sooner, all to the satisfaction of the Director.

In the absence of rain the initial watering of grassed or turfed areas is to be carried out as follows: -Grass planted levelled areas - at least twice a week.

Established lawn areas-at least once a week.

Turfed areas at least once a day for the first ten to fourteen days, thereafter at least once a week.

The Contractor must allow in his rates for providing and removing at completion all necessary temporary water piping complete with fittings, sprinklers, hoses, etc., as required for the proper watering of the grassed or turfed areas of the plateaux and banks.

Cutting of Grass: - The Contractor must commence mowing as soon as the grassed or turfed areas have become established and undertake regular mowing at approximately one week intervals up to the date of final delivery, except that, during the maintenance period, the mowing of the plateaux will be undertaken by the Provincial Works Branch.

Note: - All stages of grass planting and turfing are to be supervised on a full time basis by a competent person with the necessary knowledge and experience. It shall be the responsibility of the Contractor to advise the Director when the following operations are to be carried out in order that his representative may be present: -

- (a) the application of fertilizer
- (b) the application of weed killer

Should the Contractor fail to do so, the Director shall have the right to instruct the Contractor to repeat the operation at his own expense.

CONCRETE, FORMWORK AND REINFORCEMENT

GENERAL: - This specification applies to concrete work formed into its final shape and position in-situ.

All concrete and formwork shall be carried out in accordance with SABS Specification 1200 G -Concrete (Structural) (a copy of which the Contractor will be required to keep on the site so that it can be referred to at all times during the Contract), with the following amplifications and amendments: -

INTERPRETATIONS:-Clauses 2.1 and 2.2 refer. This preamble, together with any other supplementary preambles appearing in these Bills of Quantities shall be deemed to be the project specification and are the "Portion 2" referred to in Clause 2.2.

DEFINITIONS: - Clause 2.3 of SABS Specification 1200 G refers. All references to the Engineer shall be deemed to mean the Director.

MATERIALS

Cement: -unless otherwise specified, shall be one or more of the following and shall, in each case, comply with the requirements of the relevant standard specification:-

Portland cement and rapid-hardening cement to SABS Specification 471.

Portland blast-furnace cement to SABS Specification 626.

Portland cement 15 to SABS, Specification 831.

Nevertheless, no cement other than ordinary Portland cement shall be used without the approval of the Director. Cement containing more than 15 % blast-furnace slag will not be permitted in columns nor in members less than 50 mm thick.

In addition (for the above mentioned items) where Ordinary Portland cement is used, blast-furnace slag (from separate containers) may not be added in any proportion whatsoever.

No mixing of two different types of cement in the same batch will be allowed, and unless otherwise approved by the Director, the same brand and type shall be used in all exposed concrete.

Lumpy cement, broken sacks and sweepings shall not be used.

Cement supplied in sacks shall be used in the order in which it was delivered and shall not be kept in storage for longer than six (6) weeks without the approval of the Director.

Water: -shall be clean and free from injurious amounts of acids, alkalis, sugar, organic matter and other substances that could impair the strength or durability of the concrete. If so required by the Director, the suitability of the water shall be proved by tests carried out by an approved laboratory.

Aggregates: - Unless otherwise specified both the coarse aggregate (stone) and the fine aggregate (sand) shall comply with the requirements of SABS Specification 1083.

The Contractor is to prove compliance by means of either a certificate from the supplier or by grading analysis tests.

Admixtures:-i.e. materials other than cement, aggregate and water, shall not be used in the concrete mix without the approval of the Director. The onus for proof of satisfaction to the Director for any admixture proposed shall be with Contractor.

Reinforcement-for concrete shall be as specified and shall, in each case, comply with one of the following: -

- (a) Type A hot rolled mild steel bars of plain round cross section to SABS Specification 920.
- (b) Type C Class 2 hot rolled high yield stress Grade 1 deformed bars to SABS Specification 920.
- (c) Type D Grade 1 cold worked deformed bars to SABS Specification 920.
- (d) Welded steel fabric to SABS Specification 1024 manufactured from plain hard -drawn mild steel wire.

A sample reinforcing rod, approximately 600 mm long, may be taken from each consignment of rods of similar diameter, for testing. If any sample is found unsatisfactory the whole consignment of rods from which the sample was taken will be rejected.

No substitution of the bars specified shall be made without the prior approval of the Director.

REINFORCEMENT

Bending - Reinforcing bars shall be cut and bent to the dimensions shown on the working drawings and in accordance with SABS Specification 82.

Except as allowed for below, all bars shall be bent cold and bending shall be done slowly, a steady even pressure being used without jerk or impact.

If approved by the Director, hot bending of bars of diameter at least 32 mm shall be permitted, provided that the bars do not depend for their strength on cold working. When hot bending is approved, the bars shall be heated slowly to a cherry red heat (not above 840 °C) and after bending shall be allowed to cool slowly in air. Quenching with water shall not be permitted.

Fixing: - All steel reinforcement shall, at the time of placing of the concrete, be free from loose rust, scale, oil and other coating which might reduce the bond between the steel and the concrete or initiate corrosion of the reinforcement. Reinforcement exposed to sea spray shall be washed down, and the formwork drained, just prior to concreting.

Reinforcement shall be positioned as shown on the working drawings or as directed by the Director, and maintained in those positions within the tolerances given in the Specification for Tolerances. It shall be secured against displacement by tying at intersections with 1,6 or 1,25 mm diameter annealed wire or by the use of suitable clips or, if permitted by the Director, by welding in accordance with BS 1856. Welding will not be permitted on cold worked bars. Reinforcement shall be supported in its correct position by hangers, saddles or cover blocks and aligned by chairs and spacers all of approved design and material. Where such hangers, saddles, chairs or spacers are of steel, they will be detailed on the drawings or in bending schedules.

Cover: -The minimum cover of concrete over reinforcement, excluding any applied finish, shall be as shown on the working drawings, or as directed by the Director.

Cover shall be maintained by using cover blocks, which shall be made of small aggregate concrete, not mortar, using the same cement and aggregate type and ratio as the parent concrete. Alternatively, cover blocks may be of the plastic type provided that sufficient number are used to prevent their collapse; that they are of a colour compatible with that of concrete and that the prior approval of the Director is given. Metal cover blocks shall not be used.

If the concrete face has a Class F2 smooth finish or some other special finish as is described elsewhere, hemispherical or pyramid shaped concrete cover blocks shall be used unless otherwise specifically approved by the Director.

Splicing: - or joining of reinforcing bars shall be made only as and where shown on the working drawings or as otherwise approved. The length of the overlap in a splice shall be not less than that shown on the working drawings or forty -five times the diameter of the bar if not shown.

Protection of Exposed Bars: - If left exposed for future bonding of extensions to the works, reinforcement shall be protected from corrosion as specified by the Director.

Electric Current: - Reinforcement shall not be used as a means for conducting electric current unless there is conformity with the requirements of SABS Code of Practice 03.

Inspection of Reinforcement: - Reinforcement shall be subject to inspection by the Director after the Contractor is satisfied that it has been completely and correctly fixed. The amount of notice given by the Contractor to the Director before concreting commences that reinforcement is ready for his inspection shall be agreed between the Director and the Contractor at the commencement of the Contract.

FORMWORK

Design: - Formwork shall be so designed and constructed by the Contractor that the concrete can be properly placed and compacted and that the required shapes, finishes, positions, levels and dimensions shown on the working

drawings are maintained, subject to the tolerances given in the Specification for Tolerances. Unless otherwise directed by the Director, all formwork to beams and slabs shall be evenly cambered, unless otherwise specified or shown on the drawings, to the mid-point of the span of the member at the rate of 2 mm per metre of span, all to the approval of the Director and the full cross section of the member shall be maintained after placing of concrete.

The formwork and joints shall be capable of resisting the dead load and pressure of the wet concrete, effect of vibration equipment, wind forces and all other superimposed loads and forces it is necessary for it to carry.

Should it be necessary to support formwork off suspended or ground bearing slabs, the manner of execution of the support shall be agreed with the Director so that overstress of, or damage to, those members is prevented.

In structures having, in whole or part, two or more reinforced concrete floors, props to the, approval of the Director shall be provided under the soffits of beams and slabs of any floor which is being used to support the formwork and new concrete of the floor above. These props shall not be removed until the form work for the new concrete has been struck.

Wedges and clamps shall be used in preference to nails. Joints in forms shall be tight enough to prevent leakage of cement paste.

Finish: - The quality of the finished surface of the concrete shall be as shown on the working drawings or as otherwise specified, and the type of formwork used shall be adequate to provide such finishes.

Ties: - The type of ties used and their position shall be such that the finish required in terms of the clause "Finish" is achieved. Tie rods are preferable to wire ties and the forms shall not be secured to the reinforcement. No corrodible tie rod or wire tie shall be allowed within the depth of concrete cover, and in the case of water-retaining or tanked structures, no removable tie rod or wire shall pass right through the concrete member.

Preparation of Formwork: - Surfaces that are to be in contact with fresh (wet) concrete shall be so treated by coating with a non-staining mineral oil or other approved material, or, in the case of timber forms, by thoroughly wetting surfaces so as to ensure easy release and non-adhesion to formwork during stripping. If any substance other than water is used, every precaution shall be taken to avoid contamination of the reinforcement.

Re-use of Formwork: - Before re-use, all formwork shall be reconditioned, and all form surfaces that are to be in contact with the concrete shall be thoroughly cleaned without unduly damaging the surfaces of the formwork.

Openings: - Where necessary for the proper placing of the concrete, temporary openings for cleaning, inspection or placing purposes shall be provided, taking cognisance of the finishes specified.

Removal of Formwork: - Formwork shall not be removed before the concrete has attained sufficient strength to support its own mass and any loads that may be imposed on it. Except where the Contractor can prove by means of cube tests, at his own expense to the satisfaction of the Director that, because of its strength development characteristics the concrete has attained sufficient strength and that shorter periods are practicable, formwork shall not be removed within shorter periods than those given in Table A. The number of cube tests required shall be equal to the number required for testing at 28 days. Where full design loads are carried, no soffit forms and props may be removed until the full design strength is attained.

In structures having, in whole or part, two or more reinforced concrete floors, props to the approval of the Director shall be provided under the soffits of beams and slabs of any floor which is being used to support the formwork and concrete of the new floor above. These props shall not be removed until the formwork for the new concrete has been struck.

All formwork props shall have been removed from under beams and slabs before the commencement of construction of brickwork thereon, unless otherwise agreed with the Director.

Formwork shall be removed carefully so that shock and damage to the concrete are avoided.

TABLE A – REMOVAL OF FORMWORK (MINIMUM TIMES IN DAYS (24h))

1	2	3	4	5	6	7	8	9	10
	Portland cement and Portland cement 15			Type of cement used Rapid-hardening Portland cement* and rapid hardening Portland cement 15			Portland blast-furnace cement		
	Weather								
Type of structural member or formwork	Hot or normal	Cool	Cold	Hot or normal	Cool	Cold	Hot or normal	Cool	Cold
(a) Beam sides, walls, and unloaded columns	0.75	+	1.5	0.5	+	1	2	+	4
(b) Slabs with props left underneath	4	+	7	2	+	4	6	+	10
(c) Beam soffits with props left underneath, and ribs of a ribbed-floor construction	7	+	12	3	+	5	10	+	17

(d) Slab props including Cantilevers	10	+	17	5	+	9	10	+	17
(e) Beam props including Cantilevers	14	+	21	7	+	12	14	+	21

* Shorter period may be used for sections of thickness 300 mm or more.

+ In cool weather, stripping times shall be determined by interpolation between the periods specified for normal and cold weather.

CONCRETE QUALITY

General: -Concrete shall comply with the requirements for "Strength Concrete" as specified. The type of aggregate and cement, and their sources of supply, shall not be altered during the currency of the Contract without the prior written agreement of or instruction from the Director.

Strength Concrete: - The Contractor shall be responsible for the design of the concrete *mix* and for the proportions of its constituent materials, measured as described, necessary to produce concrete that complies with the requirements specified by the Director thus:

- (a) For each section of the work, the class of concrete and position on the Works, as shown on the drawings;
- (b) For each class of concrete
 - (i) the minimum compressive strength at 28 days as shown in Table B
 - (ii) the maximum nominal size of coarse aggregate as shown in Table B
 - (iii) the slump as shown in Table D
 - (iv) the maximum cement/water ratios as shown in Table C.

At the earliest possible stage in the Contract, at least 35 (thirty-five) days before the first concrete is placed, or as otherwise agreed with the Director, the Contractor shall submit samples of the aggregates which he proposes to use on the works to the Director.

The Contractor, under the supervision of the Director, shall prepare trial mixes using these same aggregates, to establish his ability to achieve the strengths specified, and satisfactory workability of the concrete. The Contractor shall provide all necessary equipment for, and carry out tests of moisture content of aggregates at the time of preparation of the trial mixes, tests of the slump of the mixes and at the same time cast not less than six standard cubes from each mix for compression tests.

The target strengths to be achieved under trial mix procedure shall exceed the specified minimum compressive strengths by a factor which is acceptable to the Director.

The Contractor shall also, when required to do so, prove the concrete yield obtained per sack of cement by suitable measurement of batches after placing.

No structural concrete work shall be poured until trial mix procedure has been properly followed and satisfactory 7 (seven) day compression strengths achieved. (Equivalent 28 (twenty eight) day strength = $4/3 \times 7$ day strength +5 MPa).

Thereafter, the materials, preparation of and method of manufacture of subsequent concrete shall conform accurately to those used in the accepted trial mixes. If materials vary in the course of the Contract from the samples first submitted, the Contractor shall, on the instructions of the Director, repeat the trial mix procedure and vary the proportions to attain the specified qualities.

The costs of preparation of trial mixes, with tests associated with them, shall be borne by the Contractor and must be allowed for in the pricing of the concrete.

A valid concrete test result shall be the average obtained from the testing of three test cubes of concrete in accordance with SABS Method 863.

TABLE B-CONCRETE CLASSES: STRENGTH, AGGREGATE SIZE AND COMPACTION

Class	Minimum 28 day cube compressive strength (MPa)	Maximum nominal size of coarse aggregate (mm)	Method of Compaction
50/26	50	26,5	mechanical (see clause "Compaction")
50/19		19,0	
45/26	45	26,5	
45/19		19,0	
40/26	40	26,5	
40/19		19,0	
35/26	35	26,5	
35/19		19,0	
30/37	30	37,5	
30/26		26,5	
30/19		19,0	
30/13		13,2	
25/37		25	37,5
25/26	26,5		
25/19	19,0		

25/13		13.2	
20/37	20	37,5	
20/26		26,5	
20/19		19,0	
20/13		13,2	
15/37	15	37,5	Non-mechanical (see clause "Compaction")
15/26		26,5	
15/19		19,0	
10/37	10	37,5	
10/26		26,5	
10/19		19,0	

The Contractor shall be deemed to have satisfied himself, before tendering, of his ability to produce concrete of the required quality with available materials conforming to the specification, and mixed in the proportions on which his tendered rates are based. Any subsequent alterations of the mix proportions to meet these requirements shall be at the Contractor's expense.

If, in the opinion of the Director, the concrete proportions are likely to lead to excessive segregation, honeycombing, bleeding or shrinkage cracking, he shall have the right to order the Contractor to amend the proportions at the Contractor's own cost.

TABLE C-MAXIMUM CEMENT/WATER RATIOS FOR DIFFERENT CONDITIONS OF EXPOSURE

1 Type of structure	Exposure conditions			
	2 Mild	3 Moderate	4 Severe	5 Very severe
Thin sections; reinforced piles; all sections with less than 25 mm cover reinforcement	*	0.53	0.48	0.40
Moderate sections; retaining walls, piers, beams	*	*	0.53	0.43
Exterior portions of mass concrete	*	*	0.53	0.43
Concrete slabs laid on ground	*	0.53	0.48	0.43
Concrete protected from the weather, inside buildings, or in ground below frost level	*	*	*	*

* In these cases the ratio will be based on the strength for the workability desired.

Consistency and Workability: - Slump measurements taken in accordance with SABS Method 862 shall be within the limits given in Table D appropriate to the type of construction, or within such other limits as are laid down by the Director

The concrete shall be of such workability that it can readily be compacted into the corners of the formwork and around reinforcement without segregation of the materials or excessive "bleeding" of free water at the surface.

TABLE D-SLUMP LIMITS

1 Type of construction	Slump, mm			
	2 Non-mechanical compaction		3 Mechanical compaction	
	max.	min.	max.	min.
Paving and precast units	75	50	50	30
Heavy mass construction	75	25	50	20
Reinforcing foundation walls and footings	125	50	80	30
Slabs, beams, columns, and reinforced walls	125	50	80	30
Slabs and industrial floors on ground	125	75	80	50
Plain footings, caissons, and substructure walls	100	25	60	20

Ready-mixed Concrete: - This may be used subject to the approval of the Director. This approval may be withdrawn on 24 (twenty-four) hours notice to the Contractor if at any time it does not conform to the requirements of this Specification. Ready-mixed concrete shall also comply with the requirements of SABS Specification 878. Details of the mix ingredients and tests thereon, the mix designs and relevant tests shall be forwarded to the Director for his approval. Ready-mixed concrete shall be cast within 3 (three) hours of placing all the ingredients in the mixing plant. Ready-mixed concrete shall be subject to the same sampling and testing at the site as that mixed on site and only the results of these tests will be regarded as valid.

TRANSPORTATION AND PLACING

Transportation: - Unless agreed with the Director, concrete shall not be pumped into its final position.

The Contractor must provide suitable runways for the distribution of concrete to the various parts of the structure and these must be solidly constructed in such a manner so as to obviate the possibility of interference with steel reinforcement.

Placing: - Unless otherwise agreed with the Director, the Contractor shall give the Director at least 24 (twenty-four) hours notice of his intention to place concrete and no concrete shall be placed without the prior approval of the Director and without a representative of the Director being present. Concrete shall be placed within one hour of the time of its discharge from the mixer. Concrete shall not be re-tempered by the addition of water or other material. The forms to be filled shall be clean internally. All excavations and other surfaces of an absorbent nature that are to come into contact with the concrete shall be dampened with water. There shall be no free water on the surface against which concrete is to be placed. Wherever possible, the concrete shall be deposited vertically into its final position to avoid segregation and displacement of reinforcement and other items that are to be embedded. Deposited concrete shall not be so worked (whether by means of vibrators or otherwise) as to cause it to flow laterally in such a way that segregation occurs. Where possible, the concrete shall be brought up in horizontal layers of compacted thickness not exceeding 450 mm and heaping shall be avoided.

Where a chute is used to convey the concrete, its slope shall be such as will not cause segregation, and a suitable spout or baffles shall be provided for the discharge of the concrete. Concrete shall not be allowed to fall freely through a height of more than 3 m, unless otherwise approved. Concrete shall not be placed during periods of heavy or prolonged rainfall.

Compaction: - The concrete shall be fully compacted by approved means during and immediately after placing. It shall be thoroughly worked against the formwork and around reinforcement and other embedded fittings without displacing them.

The concrete shall be free of honeycombing and planes of weakness. Successive layers of the same lift shall be thoroughly worked together.

The method of compaction shall be as specified. Mechanical compaction shall be undertaken by means of high frequency immersion vibrators of minimum frequency of 6000 vibrations per minute and a maximum acceleration of 4 g when under load, being capable of visibly affecting concrete over a radius of at least 500 mm. Vibrators shall be inserted at about 500 mm centres and withdrawn slowly to close the hole formed by the vibrator.

Non-mechanical compaction shall be undertaken by means of spading, rodding or forking.

Over-compaction resulting in segregation, surface laitance or leakage (or any combination of these) shall not be allowed.

Vibrators shall not be allowed to come within 30 mm of the face of the formwork in the case of formed finishes, nor within 75 mm of the face of the formwork in the case of special finishes.

Construction Joints: - Concreting shall be carried out continuously up to the construction joints shown on the working drawings or as prior approved by the Director, except that if, because of an emergency (such as a breakdown of the mixing plant or the occurrence of unsuitable weather), concreting has to be interrupted a construction joint shall be formed at the place of stoppage in conformity with the detail shown on the drawings for construction joints generally and in the manner which will least impair the durability, appearance and proper functioning of the concrete. The Director shall approve the method adopted for forming the construction joints, one of the following methods being adopted, as relevant: -

(a) Construction joints when concrete is not more than 24 h old: - The surface of the concrete shall be brushed with a steel wire brush before new mortar and concrete are placed as specified in (b) below.

(b) Construction joints when concrete is more than 24 h but not more than 3 days old: -The surface of the concrete shall be sand-blasted or chipped with a light hammer, swept clean, and thoroughly wetted and covered with a 10 mm thick layer of mortar composed of cement and sand mixed in the same ratio as the cement and sand in the concrete mixture. This mortar shall be freshly mixed and placed immediately before the new concrete is placed.

(c) Construction joints when concrete is more than 3 days old: -The procedure specified in (b) above shall be followed, except that the old surface shall be prepared and kept continuously wet for at least 24 h before the mortar and new concrete are placed.

(d) Construction joints at tops of columns. The procedure for brushing or cleaning specified in (a) or (b) above, as applicable, shall be followed before the steel reinforcement of the slab or floor to be cast on the columns is placed in position.

Curing and protection: - Formwork shall be retained in position for the appropriate period given in the clause "Removal of Formwork" and shall be considered as providing adequate curing on those surfaces for that period. Should this curing period still be less than that specified, alternatively, should surfaces not be cured by forms then all such concrete shall immediately be protected from contamination and loss of moisture by one or more of the following methods: -

(a) Ponding the exposed surfaces by means of water, except where atmospheric temperatures are low, i.e., less than 2°C;

(b) Covering the concrete with sand, or mats made of a moisture-retaining material, and keeping the covering continuously wet;

(c) Continuous spraying of the exposed surfaces with water;

(d) Covering with a waterproof or plastic sheeting firmly anchored at the edges;

(e) Using a prior approved curing compound applied in accordance with the manufacturer's instructions, provided that in this case, the presence of the compound is not detrimental to subsequently applied finishes.

Whatever method of curing is adopted, its application shall not cause staining, contamination, or marring of the surface of the concrete.

The curing period shall be at least 5 days for concrete made with Portland cement, at least 2 days for that made with rapid-hardening Portland cement and at least 7 days if Portland blast-furnace cement is used. When atmospheric temperatures are below 5 °C these minimum-curing periods shall be extended by 72, 36 and 72 hours respectively.

CONSTRUCTION DETAILS

Holes, Chases and Fixing Blocks: - No holes or chases other than those shown on the working drawings or approved by the Director shall be cut or otherwise formed in the concrete.

No blocks for the attachment of fixtures shall be embedded in the concrete unless approved by the Director.

Pipes and Conduits: - No pipes or conduits other than those shown on the working drawings shall be embedded in the concrete without the approval of the Director. The clear space between any such pipes and the clear distance between such a pipe and any reinforcement shall be at least 25 mm or the maximum size of the coarse aggregate plus 5 mm, whichever is greater. The amount of concrete cover over pipes and fittings shall be at least 25 mm.

Honeycombing and Other Defects: - After removal of the forms, if the concrete shows any defect in terms of the Specification for Finishes for that concrete, the Contractor shall, on the instructions of the Director, make good the defect at his own cost, by either removing and replacing the defective concrete, or by patching, all as approved by the Director and to the standard of finish required. No remedial work shall be carried out by the Contractor without the prior approval of the Director.

Building on Concrete Footings: - No structural load shall be imposed on concrete footings until at least three days after depositing the concrete in the case of mass concrete footings, and after seven days in the case of reinforced concrete footings, or as may be directed by the Director.

RECORDS: -The Contractor shall maintain written records indicating: -

- (a) The date on which each section was concreted, the time taken to place the concrete, and the position of that section in the Works and its construction joints;
- (b) Daily weather conditions with temperatures being recorded by maximum and minimum thermometers; and
- (c) The nature of samples and dates on which they were taken. In the case of cubes these shall also state the identification marks, test results and age, minimum strength required and position of parent concrete.

TESTS

Compressive Strength: - During the time in which each class of concrete, having a specified 28 day compressive strength equal to or greater than 20 MPa, is being placed, samples of the concrete shall be taken from the point of deposit at the rate of at least one sample from each 5 m³ of concrete placed in columns, and from each 30 m³ or part thereof of concrete placed elsewhere, but in either case, nevertheless at least once a week. A group of at least three 150 mm test cubes shall be made from each sample for testing at 28 days age. If the Contractor plans to execute further work which relies on previously completed work for support but for which the results of 28 day tests are not available, he is to prove the strength of that concrete by taking and testing at 7 days age an equal number of test cubes to that which is to be tested at 28 days age, prior to the commencement of the planned further work.

The cost of the necessary extra test cubes and testing will be for the Contractor's account. Each group of test cubes shall be deemed to represent the whole of the concrete from which sample was taken and shall be identifiable with the concrete.

The Contractor shall provide, at his own expense, sufficient moulds to keep pace with the rate of concreting. He shall also perform all tasks in respect of compressive strength testing except the actual crushing.

If ready-mixed concrete is used, site testing as specified herein shall still be undertaken, and only the results of such site testing shall be considered in determining the acceptance or otherwise of the concrete.

Grading Analysis: - If so directed by the Director, a grading analysis shall be made for each 40 m³ of fine aggregate to be used, and for each 75 m³ of the coarse aggregate to be used. The analysis shall be made by the method given in SABS Specification 1083.

Determination of Consistency: - When the slump test is used to measure the consistency of the concrete mix, it shall be carried out by the method given in SABS Method 862 with samples taken in accordance with SABS Method 861.

Costs of Tests: -to concrete, trial mixes, cement, aggregates, water and reinforcing steel shall be borne by the Contractor. The Contractor shall also bear the costs of any other tests (including load tests) which are required as a result of failure on the part of the Contractor to meet the requirements of the Specification.

An item against which the Contractor may allow for all costs in connection with tests on concrete cubes has been included elsewhere in these Bills of Quantities.

Testing Authority: -The crushing of cubes and testing of other samples except in the case of the clause "Determination of Consistency" shall be undertaken by an independent Authority as approved by the Director. The Contractor shall arrange with the Authority that copies of the results of all tests are sent direct to the Director.

ACCEPTANCE CRITERIA FOR STRENGTH CONCRETE: - Should any test result obtained from a set of three test cubes of concrete of a specific grade that have been made and tested as specified show that the strength is more than 3 MPa below the specified strength, the concrete represented by such results shall be deemed to have failed to meet the Specification. Should an examination carried out in terms of the clause "Procedure in the event of failure" satisfy the Director that the structural adequacy and durability of that part of the structure where the concrete concerned has been used, is not impaired, the concrete will be acceptable. The Contractor will however be required to review the mix design and any other factors influencing the quality to ensure that further concrete is acceptable. Where three or more consecutive valid test results (i.e., results of sets of three test cubes that have been made and tested as specified) become available, the following criteria shall apply:

- (a) The average of any three consecutive valid test results obtained on concrete of a specific grade must exceed the specified strength by at least 2 MPa.
- (b) If the criterion given in (a) above is not met but the average is at least equal to the specified strength, the concrete cast will be acceptable but the Contractor will be required to adjust the mix design and standard of control.

Should the average result be less than the specified strength an examination must be carried out in terms of the clause "Procedure in the event of failure" on that part of the structure in which concrete represented by the result has been used.

Alternatively, should a concreting operation be of such size or the testing be of such frequency that thirty or more valid test results (i.e., results of sets of three test cubes that have been made and tested as specified) become available within three months, the Contractor may choose, subject to the approval of the Director, to have the results assessed statistically. In such a case, the average of all the test results of a specific grade of concrete at *any stage* must exceed the specified strength by at least 1,7 standard deviations, failing which the Contractor will be required to adjust the mix design to ensure compliance with this criterion.

PROCEDURE IN THE EVENT OF FAILURE: - If after the evaluation of the test results in terms of the clause "Acceptance criteria for strength concrete" an examination of the concrete in the structure is necessary, one or more of the following procedures in the sequence given may be adopted at the discretion of the Director, and for the account of the Contractor, to determine the acceptability or otherwise of the concrete in that particular part of the structure:

1. An assessment of the stress level in the structure concerned in relation to the test result obtained.
2. Non-destructive testing, subject to the availability of similar concrete of proven acceptable quality in comparable members in the same construction as a reference.
3. The testing of drilled cores in accordance with the relevant SABS Standard Methods.
4. Full scale load tests in accordance with Section 6 of SABS Code of Practice 0100: Part II.

Where load tests are, in the opinion of the Director, unsuitable or impracticable, and if an examination carried out in terms of the above does not show the concrete strength to be acceptable, or if a tested portion of the structure fails to pass the tests, the Contractor shall, on the instructions of the Director, replace or strengthen by approved means (a) each portion that failed or contains concrete that failed, as relevant, and (b) any other portion, irrespective of strength, the functional purpose of which is affected by the portion or concrete referred to in (a) above.

NON-STRUCTURAL PRESCRIBED MIX CONCRETE: - Concrete for non-structural purposes shall be "Prescribed mix concrete" produced in accordance with the requirements indicated in the table below, and the Contractor is also referred to the foregoing Preambles insofar as they apply: -

Class of Concrete	Estimated minimum compressive strength in Mpa at 28 days	Maximum nominal size of coarse aggregate in mm	Proportion of Constituents		
			Cement (Parts)	Fine Aggregate (Parts)	Coarse Aggregate (Parts)
A	7	37.5	1	4	8
B	15	19.0	1	3	5
C	20	19.0	1	2.5	3.5

Cement and aggregates shall be mixed by volume and the contents of a 50kg sack of cement shall be taken to be 0,033 m³. The cement/water ratios and the maximum and minimum slumps for concrete shall be as previously listed in Tables C and D.

The Director shall have the right to vary the proportions of the constituents in any of the prescribed mixes as necessary to obtain the required compressive strength, optimum density and workability of the concrete. Any variation in the rates of the concrete will only be considered if the proportion of cement to the total volume of aggregate, in each case, is varied from that specified.

Notwithstanding any requirements previously described, the Director may permit certain items of non-structural concrete in small quantities to be mixed by hand.

Where concrete is mixed by hand, the coarse aggregate shall be spread out on a timber, concrete or metal platform in a flat heap, the sand then spread evenly over the heap, followed by the cement also spread evenly, and the whole thoroughly mixed by shovelling from the centre to the side to form a ring, then back to the centre and again to the side. Water shall then be poured into the ring and the materials mixed into it and then back into the ring, the

remainder of the water then added slowly as materials are mixed into it. Mixing shall continue until the colour is uniform and the consistency the same throughout the pile.

"NO-FINES" CONCRETE-shall consist of one part of cement to eight parts of 19mm aggregate (1:8 - 19 mm stone) with a water/cement ratio of approximately 0,46. This water/cement ratio may be varied slightly to suit conditions on approval by the Director.

The quantity of water used shall be just sufficient to form a smooth grout which shall completely coat every particle of aggregate and also to ensure that the grout is just wet enough to form a small fillet at each point of contact between the stones. "No-fines" concrete mixed with excessive water, which results in a thin grout which drops off the aggregate, will be rejected.

"No-fines" concrete shall be placed in its final position within 20 minutes of mixing and shall be placed in continuous horizontal layers. "No - fines" concrete shall be spade worked sufficiently to ensure that it fills the forms but vibrating, tamping or ramming will not be permitted.

BREEZE CONCRETE: - shall consist of one part cement to eight parts clean dry furnace ashes, the ashes being free from all coal or other foreign matter and graded up to particles which will pass a 26,5 mm ring from a minimum which passes a 4,75 mm mesh. The finer materials from the screening to be first mixed with the cement into the mortar and the ashes added afterwards and thoroughly incorporated. The breeze concrete is to be mixed in batches not exceeding 0,1 m³ and each batch is to be immediately placed in position. The ashes for breeze concrete are to be obtained in an unscreened state and are to be kept dry so that sufficient fine material will be obtained from the screening to make the mortar.

FINISHES TO IN-SITU CONCRETE

Formed Finishes: - are those concrete surface finishes developed using formwork and whose standard of finish in each class shall be as described.

The Director shall be informed by the Contractor of any defect in terms of this Specification, and no remedial work shall be carried out by the Contractor without the prior approval of the Director. Any defect shall be made good at the Contractor's expense by either removing and replacing the defective concrete, or, in certain instances only, by patching, all as approved by the Director and to the standard of finish required.

Class F1 Ordinary Finish: - Formwork panels shall be of such quality that upon removal, the concrete is true and even, free from fins and recesses greater than 5 mm size, honeycombing, large air holes and the like. Bolt holes shall be filled if so required by the Director.

Class F2 Smooth Finish: -This class of finish requires a high standard of concrete work, formwork and technique.

Concrete placed in any one structure to give this finish shall be made from cement and aggregates from the same source, and similarly, the grading of the aggregate shall be kept constant.

Formwork shall be metal or wrought timber in a new condition designed and constructed to suit the particular job in hand and with shutter bolts and joints between panels in a regular pattern approved by the Director. Joints between panels shall be watertight, but the use of sealing tape which will mark the concrete shall not be permitted.

Construction joints shall be in the position and of the detail shown upon the working drawings. Should the Contractor wish to incorporate further construction joints or amend the position of those shown to suit his own requirements or technique, this may be allowed provided that all design considerations are met, that the prior approval of the Director is obtained and that any extra costs are borne by the Contractor. In the case of horizontal construction joints, the top edge of the concrete on the Class F2 smooth finish side is to be struck true and level with a trowel.

Special care shall be taken to ensure that forms are clean of all pieces of tying wire, nails and other debris at the time of concreting.

The standard of finish shall be such that, upon removal of the formwork, no further treatment, other than treatment of bolt holes if required, shall be found necessary to provide a straight, smooth and uniform finish of good quality and consistent colour and texture, free of all honeycombing and large air holes.

UNFORMED FINISHES: - are those concrete surface finishes developed without the use of formwork.

Class U1 Ordinary Finish -Immediately after placing, the concrete shall be finished by screeding with the edge of a wooden board of straight and true line and working between guides set accurately to level. No mortar shall be added and noticeable surface irregularities caused by the displacement of coarse aggregate shall be made good by rescreeding after removing or tamping down the offending aggregate.

Class U2 Wood Float Finish: -The concrete surface shall first be brought to the standard Class U1 ordinary finish and then floated with a wood float. Floating shall be started as soon as the screeded finish is stiffened sufficiently and the bleed water has evaporated or been removed and it shall be the minimum necessary to produce a surface free from screed marks and uniform in texture.

Class U3 Steel Trowel Finish: - The concrete surface shall first be brought to the standard of Class U2 wood float finish with floating being continued until a small amount of mortar without excess water is brought to the surface and then when the floated surface has hardened sufficiently to prevent any more excess fine material from being drawn to the surface, trowelling with a steel trowel. Trowelling shall be performed with firm pressure such as will flatten the sandy texture of the floated surface and produce a dense uniform surface free from blemishes and trowel marks. Gradual surface irregularities shall not exceed 5 mm over any 3 m. The sprinkling of sand and/or neat cement on the surface to absorb excess moisture shall not be permitted.

Class U4 Power Float Finish: -The concrete surface shall first be brought to the standard of Class U1 ordinary finish using wooden screeding boards or steel rollers. After evaporation or removal of all bleed water and immediately the concrete is stiff enough to support the machine the surface shall be closed with a mechanical power float and then finished with a mechanical power trowel. The texture of the finished surface shall be either non-slip or polished as shown on the drawings. Irregularities shall be of long wavelength not exceeding a curvature of 2 mm in 600 mm. Under no circumstances shall sand and or neat cement be sprinkled over the surface either to absorb excess moisture or to fill surface blemishes or irregularities. Power floats and trowels shall be operated by skilled operators.

TOLERANCES: - Clause 6 refers. Unless otherwise agreed by the Director, Degree of Accuracy I shall apply to all concrete work and steel reinforcing.

SUPERVISION: - The construction of all concrete work shall at all times be under the supervision of a competent person experienced in the production and placing of high grade concrete. He shall personally supervise all work relating to the concrete construction and pay special regard to:-

- (a) The quality, testing and mixing of materials.
- (b) The finish, stability and cleanliness of formwork and excavations.
- (c) The cleanliness, correct positioning and maintenance in position of steel reinforcement.
- (d) The transporting, placing, compacting and curing of the concrete.
- (e) The construction and stripping of formwork.
- (f) The production of samples, test cubes, slump and other tests.

GENERAL

Measurement and Payment - The provisions of Clause 8 will NOT apply and the system of measurement which is adopted in these Bills of Quantities is the only system of measurement which will be recognised in this Contract. No deductions have been made for pipes not exceeding 200 mm internal diameter, reinforcement, conduits, structural steel, bolts and the like.

Rates for Concrete: - are to include for mixing, handling and depositing (by hoisting or lowering) in the forms. Rates for items of reinforced concrete are to include for thoroughly working and packing around the steel reinforcement. All reinforcement, except where otherwise described, has been measured separately.

Rates for concrete surface beds are to include for laying in suitable size panels not exceeding 20 m² or as may be directed.

The Contractor is to allow in his pricing of the concrete for all construction joints.

Striking off and Curing: - of concrete slabs and surface beds has been measured separately. The rates for all other items of concrete including stairs and landings and concrete blindings, are, except where otherwise described, to include for all necessary striking off of surfaces and curing.

The rates for items of striking off and curing top surfaces of concrete shall, unless otherwise described, apply to level surfaces.

Where exposed sloping surfaces of concrete do not exceed the limits of pitches laid down for the measurement of back shuttering, the striking off and curing of the sloping top surfaces has been measured in the case of concrete slabs and surface beds, and in other cases provision has been made for dressing the concrete surfaces to splay

Where items of striking off and curing are described as to falls or ramps this shall include cross falls, etc.

The rates for striking off and curing of surface beds formed in panels must also include for all necessary temporary formwork in forming the panels.

Rates for Formwork: - are to be for use and waste only (except where described as "permanent") and are to include for fitting together in the required forms, propping, strutting, shoring, wedging, plumbing and fixing to true angles and surfaces, cambering formwork to slabs and beams where required, preparation and treatment of surfaces as necessary to ensure easy release during stripping, reconditioning as necessary before re-use, providing necessary temporary openings for the purpose of cleaning, inspection and placing of concrete, and for all straight cuttings, splayed edges, intersections, notchings and narrow widths, including waste and properly fitting at intersections, maintaining in position for periods as directed and for striking and re moving.

Rates for items of formwork to soffits of slabs and to sides and soffits of beams, lintols and the like are to include for horsing exceeding 1,5 m and not exceeding 4,5 m high unless otherwise stated in the items. Rates for formwork to soffits of stairs and landings are to include for all necessary horsing.

Rates for Permanent Formwork: - are to include for leaving in all formwork, props, etc., as permanent formwork shall be regarded as not being recoverable.

Rates for Steel Fabric Reinforcement: - are to include for lapping the reinforcement at all edges, as specified, for all cutting and waste, notching, etc., bending where required, wiring together at laps and for maintaining in position during placing of concrete.

Rates for Steel Bar Reinforcement: - are to include for all cutting, bending, hooked ends, wiring together at passing points, hoisting or lowering to the required levels, fixing in accordance with the detail drawings, cover blocks and maintaining in position during placing of concrete. The mass of mild and high yield stress steel bars shall be based on

the values shown in Table EI of SABS Specification 920-Appendix E (with no allowance being made for rolling margin and waste).

The mass of the binding wire required for fastening the reinforcement together is not included in the mass of the reinforcement. Provision for the cost of this wire shall be deemed to have been made by the Contractor in calculating the unit rate for the net mass (i.e. excluding the mass of binding wire) of the reinforcement.

BRICKWORK

SAND: -shall comply with the requirements of SABS Specification 1090, washed where necessary and screened through a 2360 micrometre mesh sieve.

CEMENT: -shall be Portland cement of normal setting quality complying with SABS Specification 471 or Portland cement 15 complying with SABS Specification 831. Cement containing more than 15 % blast furnace slag will not be permitted to be used.

LIME: -shall be hydrated lime complying with SABS Specification 523.

WATER: -shall be clean and free from injurious amounts of acids, alkalis, and other organic substances. If so required by the Director, the suitability of the water shall be proved by tests carried out by an approved laboratory.

CEMENT MORTAR: -unless otherwise described shall be composed of one part by volume of cement to five parts by volume of sand.

COMPO MORTAR: - unless otherwise described, shall be composed of one part by volume of cement, one part by volume of lime to ten parts by volume of sand.

STRENGTH MORTAR: -where required shall be of the class specified and as defined in Table C-1 of SABS Code of Practice 0164-Part I.

MIXING OF MORTAR: - the materials are to be mixed dry on a non-absorbent and close jointed timber or iron platform until the mixture is of a uniform colour, with water added and the mixture turned over until the ingredients are thoroughly incorporated.

No cement mortar that has once commenced to set will be allowed to be used. Mixing platforms are to be cleaned and old mortar removed before any new batch of mortar is prepared for mixing.

TESTING OF STRENGTH MORTAR: -During the time brickwork is being laid samples shall be taken of the mortar being used as shall be directed by the Director. A group of three 70 x 70 x 70 mm test cubes shall be made from each sample for testing at 28 days age. Each group of test cubes shall be deemed to represent the whole of the batch from which the sample was taken and shall be identifiable with the batch.

The testing shall be undertaken by an independent firm or institution nominated by the Contractor to the approval of the Director. An item for the testing of mortar cubes has been provided elsewhere in these Bills of Quantities.

BURNT CLAY COMMON BRICKS: - shall comply with SABS Specification 227 and are to be good quality, sound, hard, well burnt bricks, uniform in size and shape.

A sample load of bricks is to be approved by the Director and all subsequent loads are to be equal thereto.

BRICKS FOR FOUNDATIONS: - are to be as above but extra hard burnt bricks.

Reject facing bricks may be used in lieu of extra hard burnt foundation bricks provided they are equal to a sample to be submitted to and approved by the Director.

FACING BRICKS, PAVING BRICKS, QUARRY TILES, ETC.: -Facing bricks shall comply with SABS Specification 227. Facing bricks, paving bricks, quarry tiles, terra cotta grille blocks, etc., are to be of the types and colours specified, specially selected, free from blemishes, square on all faces, uniform in size, shape and colour and equal to a sample to be deposited with and approved by the Director.

Special care must be taken to preserve the arrisses and faces of facing bricks, paving bricks, quarry tiles, etc., during transit and handling.

BRICKWORK: - unless otherwise described is to be in burnt clay common bricks and wherever practicable is to be in stretcher bond with the skins tied together with and including galvanised crimped wire wall ties in accordance with SABS Specification 28. The wire ties are to be of sufficient length to allow not less than 75 mm of each end to be built into brickwork, built into every fourth course and spaced at 450 mm staggered centres (seven ties per square metre). The bricks are to be well wetted before being laid and the course of bricks laid last is to be well wetted before bedding the next course of bricks upon it. The brickwork is to have the perpend flushed up solid and each course is to be laid on a solid bed of mortar. No false headers are to be used. Whole bricks are to be used except where bats or closers are legitimately required to form bond.

Unless otherwise described one brick walls are taken at a nominal thickness of 230 mm. The joints of all walls to be plastered are to be raked out as the work proceeds to form key for plaster. All walls are to be carried up regularly so that no part be built more than 1,2 m higher than the adjoining walls.

Mortar joints generally are not to exceed 10mm thickness unless otherwise indicated on the drawings. If a specific brick scale is indicated on the drawings, either drawn or written, it must be adhered to.

HOLLOW WALLS: - are to be formed of two thicknesses of brickwork as specified with cavity between, tied together, unless otherwise specified, with and including A.I.S.I. Type 304 stainless steel wire butterfly type wall ties in accordance with SABS Specification 23, of sufficient length to allow not less than 75 mm of each end to be built into brickwork, built into every fourth course and spaced at 450mm staggered centres (seven ties per square metre). Cavities are to be kept clear of all rubbish, mortar droppings and projecting mortar.

BRICK LININGS TO CONCRETE: - unless otherwise described are to be tied to concrete with and including A.I.S.I. Type 304 stainless steel wire wall ties complying with SABS Specification 28 with one end embedded 75 mm deep into concrete and other end built into the brick joints and spaced not less than seven ties per square metre.

REINFORCED BRICK LINTOLS: - unless otherwise detailed are to be constructed in accordance with N.P.A. Type Drawing.

PRECAST PRESTRESSED CONCRETE LINTOLS: - where specified, are to be of approved manufacture and the Contractor is to provide the Director with a certificate issued by the manufacturer certifying that the lintols are adequate for the purpose in terms of span, loading and number of courses and construction of brickwork above the lintol. The manufacturer is also to specify the minimum bearing required at each bearing end and the nature and period of temporary propping required. Rates for precast prestressed concrete lintols are to include for any cement mortar filling required and for temporary propping in accordance with the manufacturer's instructions.

BAGGING DOWN BRICKWORK: - shall be carried out when the mortar in joints is still soft by rubbing over with wet rough sacking until all joints and crevices are evenly filled, including additional mortar if necessary to obtain an even surface or, when the mortar in joints is set, by rubbing over as described but including cement grout as necessary to fill up the joints and crevices.

CRAMPS: - for timber door frames shall be 1,6 mm thick galvanised hoop iron 32 mm wide with one end turned up 50 mm and twice screwed to stile of frame and built 450 mm deep into wall with other end turned up into brick joint and cranked as necessary where built into cavity wall. Cramps shall be built in approximately 330 mm from top and bottom of stile and intermediately at not exceeding 825 mm.

TIES TO WALL PLATES, RAFTERS, ETC.: - shall be 1,6 mm thick galvanised hoop iron 32 mm wide and at least 1500 mm long with one end turned up and built in not less than ten courses deep into brickwork or embedded in concrete beam or slab and with other end left projecting and wrapped around timber rafter and spiked to timber wall plate. Where ties are embedded in concrete beam or slab they must be wrapped around the bottom steel bar reinforcement of the beam or slab.

WELDED MESH BRICK REINFORCEMENT: - shall be 55, 80, 155 or 235 mm wide consisting of two 3,55 mm main high tensile steel wires at 50, 75, 150 or 230 mm centres respectively with 2,80 mm high tensile steel cross wires electrically welded at 300 mm, centres, lapped 150mm, at end joints, 75 mm at angles and built 110 mm into connecting walls. No allowance has been made for laps.

BITUMEN EMULSION WATERPROOFING TO BRICKWORK: - The inner thickness of external superstructure walls whether hollow or solid, behind facing bricks, is to be bagged and painted with two coats of approved bitumen

emulsion waterproofing compound.

FACED BRICKWORK: -Facing bricks shall be sorted to ensure proper mixing of the bricks within the colour range of each type of facing bricks. Sudden changes in the general colour of faced brickwork in any one type of facing brick will not be acceptable. Sand used in mortar for faced brickwork is to be clean washed sand and sand from the same source is to be used throughout to maintain a uniform appearance. Faced brickwork is to be pointed as specified as the work proceeds. Keyed-in joints are to be formed with a round jointing tool and square recessed joints are to be approximately 6 mm deep formed with a square jointing tool. All pends are to be accurately kept. The bond is to be broken, if necessary, in the centre of panels above and below windows, above doors, between openings and in the centre of sides to piers. No broken bond will be allowed at reveals or quoins. All cutting to face bricks is to be done with carborundum or other approved high-speed brick saw. Faced brickwork is to be protected from injury, mortar splashes, etc., and cleaned down with spirits of salts and scrubbed down with water at completion to the approval of the Director.

PAVING BRICKS AND QUARRY TILES: -unless otherwise described are to be pointed as the work proceeds with 6 mm wide keyed-in joints. Paving bricks and quarry tile pavings, cills, etc., are to be protected from injury, mortar splashes, etc., and cleaned down with spirits of salts and scrubbed down with water at completion to the approval of the Director.

ASBESTOS CEMENT CILLS: - are to be of approved manufacture without fixing lugs, even in shape, uniform in colour, free from cracks, twists and other defects, in single length between reveals and of the thickness and colour specified and equal to approved sample.

RATES

Brickwork Generally. - Rates for brickwork are to include for hacking the face, or raking out the joints, of brickwork where necessary to form key for plaster, etc., and for plumbing angles and surfaces, all square cutting, wedging and pinning against columns, beams, slabs, etc., for all waste in cutting and wire ties required in tying skins together as described.

Rates for hollow walls are to include in addition to the above for keeping the cavities clean and free of mortar droppings and for butterfly type wall ties, all as described.

Where items are described as cut and pinned, built in, bedded, wedged and pinned, etc., rates are to include for grouting in or bedding solid with 1:3 cement mortar, unless otherwise stated.

Where window units, etc., are described for building in as composite, rates are to include for assembling of units as required and, unless otherwise described, for tap screwing to coupling mullions or transoms, including holes.

Faced Brickwork, etc.: -Rates for all fair and faced brickwork, brick pavings, grille block walls and the like are to include in addition to the foregoing for building or laying to true surfaces and angles, all fair square cutting and fitting and cleaning down to approval at completion.

Rates for brick cills, copings, steps, margins, thresholds and the like shall include for fair ends and angles unless different bricks or tiles are used or special cutting is required.

Rates for items described as "Extra over ordinary brickwork" are to be for the extra cost of the facing bricks specified over common brickwork built in stretcher bond, and are to include for building in cement mortar consisting of one part cement to five parts clean washed sand and for pointing as described.

Rates for items described as "Labour and Material" are to be for the full cost of the facing bricks specified, and otherwise as above described.

Rates for all cut face brick linings are to include for cutting and bonding at ends.

Quarry Tiles: - Rates are to include for all square cutting and fitting, bedding and jointing in cement mortar consisting of one part cement to three parts clean washed sand, for pointing as described as the work proceeds and cleaning down to approval at completion.

Rates for treads, cills, copings, cappings, skirtings, etc., are to include for pointing to exposed edges, ends and projecting soffits.

Air Bricks: - Rates for air bricks and air vent gratings are to include for forming openings through the walls, for all necessary jack arches and turning pieces, for plastering all round the openings in cement mortar, and where in hollow walls, for building cavity solid all round in addition:

Asbestos Cement Cills: - Rates are to include for all square cutting and waste and fitting and for bedding in an approved epoxy adhesive.

Terra Cotta Grille Blocks: - Rates are to include for all square cutting and waste and fitting, bedding and jointing in cement mortar consisting of one part cement to three parts clean washed sand and for pointing with keyed in joints on both faces and into reveals of openings as the work proceeds.

WATERPROOFING

GENERAL :- All measurements are net - no allowance being made for laps in sheet materials or for waste in cutting.

WORKMANSHIP:- All work is to be carried out to the approval of the Director by skilled and qualified workmen and in accordance with the methods prescribed in SABS Code of Practice 021 for waterproofing of buildings.

All work is to be executed in accordance with the instructions issued by the manufacturer of the material being used. Roof coverings and linings are to be laid to the falls, cross falls, etc., provided in the screeds or other surfaces to which they are to be applied.

Surfaces to be waterproofed are to be dry and cleaned of all dust, chips, etc., immediately prior to the commencement of this work and are to be free of any contaminating substances or projections which may damage the waterproofing materials being used.

POLYETHYLENE SHEETING: - is to comply with SABS Specification 952 and bear the SABS mark. The sheeting is to be laid with a minimum lap of 150 mm, unless otherwise specified, at angles and junctions with laps sealed in accordance with the manufacturer's instructions.

MASTIC ASPHALT ROOFING:- is to conform to SABS Specification 297 and is to be laid hot in two or three layers, as stated, with each layer of minimum 10 mm thickness and laid to break joint with the underlying layer by not less than 150mm.

Prior to the commencement of any work the specialists who lay the mastic asphalt roofing are to satisfy themselves as to the acceptability of the surfaces upon which the mastic asphalt is to be laid, as the said specialists will be held fully responsible therefore.

Mastic asphalt to surfaces not exceeding 10° slope is to be laid in two layers on and including one layer of approved reinforced waterproof building paper lapped 75 mm at all edges. Rates are to include for all cutting and waste on building paper.

Mastic asphalt to surfaces exceeding 10° and not exceeding 20° slope is to be laid in two layers on surfaces which have been hacked, grooved or scoured to provide an adequate key. Rates are to include for the necessary preparation of the surfaces

Mastic asphalt to vertical surfaces and surfaces exceeding 20° slope is to be laid in three layers on and including any necessary expanded metal lathing securely fixed to the surfaces to prevent creeping. Where vertical surfaces do not exceed 300 mm in height the surfaces to receive mastic asphalt may alternatively be prime coated with a latex based bitumen emulsion primer prior to the application of the mastic asphalt.

Angle fillets to all internal angles are to be run in one operation.

Finishing coats of bituminous-based aluminium paint on mastic asphalt roofing have been measured separately.

FLEXIBLE GLASS-FIBRE REINFORCED POLYESTER WATERPROOFING: - shall be of the type specified, or other approved, supplied and laid in-situ by a specialist sub-contractor, all to the approval of the Director and shall carry a written 10 (ten) year guarantee.

The waterproofing applied in-situ shall consist of one layer of three-ply bituminous felt underlay bonded to the substrate and covered with flexible glass-fibre reinforced polyester waterproofing comprising a chopped strand glass-fibre mat having a minimum mass of 450 g/m², impregnated with flexible unsaturated polyester resin and finished with two coats of abrasion-resistant flexible unsaturated polyester surface coating which shall not show any sign of the glass-fibre reinforcement. The total mass of the waterproofing (excluding the bituminous felt underlay) shall be not less than 1,8 kg/m².

Chopped strand glass-fibre mat reinforcement is to comply with the requirements of SABS Specification 419.

All unsaturated polyester resins are to be suitable for their intended use and comply with SABS Specification 713 and are to be ultra-violet ray stabilised.

All flexible glass-fibre reinforced polyester waterproofing is to be finished to approved opaque colours (excluding red or orange tints), is to be properly cured, and is to be free from porosity, blisters, cracks, surface crazing or other defects which may affect its appearance or its performance, with the surface colours consistent throughout.

Samples of flexible glass-fibre reinforced polyester waterproofing are to be submitted to and approved by the Director and all work executed is to be equal to the approved samples.

EXPANSION JOINT SEALANTS: - Polysulphide sealants, where specified, are to be approved polysulphide sealants complying with SABS Specification 110. Type 2, well compacted into joint and neatly pointed.

Rates are to include for priming joints where recommended by the manufacturer of the sealant being used with a suitable and approved primer.

All work is to be executed by the manufacturer of the material, or other specialist firm, all in accordance with the manufacturer's instructions.

RATES: - for all roofing and linings are to include for cleaning and preparing the surfaces to be waterproofed as

before described, for protecting from damage and cleaning down, flood-testing if required and handing over in an acceptable and guaranteed watertight condition at completion.

Rates for sheet waterproofing materials are to include for all dressing, bending, narrow widths, angles, intersections, cutting and waste and where applicable for the extra material required for lapping and for sealing laps as described. Rates for roofing described as laid on "flat" roofs are to include for laying to slopes not exceeding 10 degrees from the horizontal.

ROOF COVERINGS

"MARSEILLES" PATTERN CLAY ROOFING TILES: - shall conform to SABS Specification 632. The tiles are to be of the colour specified and are to be even in thickness, uniform in shape and colour and free from cracks and blemishes. The tiles are to be laid to "broken bond" with vertical joints and bottom edges of each course ranging perfectly straight.

Unless otherwise specified each tile in every third course, all tiles in eaves and ridge courses, tiles in every course on each side of hips and valleys and all half and full tiles at verges shall be secured with 1,60 mm copper wire passed through catch holes in ribs and wound around the battens or wound around copper clout headed nails driven into battens. Where catch holes in tiles have been cut off at hips, valleys, top edges, etc., new holes are to be drilled.

All ridge and hip cappings are to be of the types specified and of colour to match the roofing tiles. The cappings are to have spigoted and socketed ends and are to be bedded, jointed, pointed and torched up over top of roofing tiles in 1:3 cement mortar tinted to match the tiles. Each tile of hip capping and every fourth tile of ridge cappings is to be drilled for and secured with copper clout headed nails.

CONCRETE ROOFING TILES: - shall conform to SABS Specification. 542. The tiles are to be of pattern and colour specified and are to be even in thickness, uniform in shape and colour and free from cracks and blemishes. The tiles are to be laid to "straight bond" in accordance with SABS Code of Practice 062 with vertical joints and bottom edges of each course ranging perfectly straight.

Unless otherwise specified each tile in every third course, all tiles in eaves and ridge courses and tiles in every course on each side of hips and valleys shall be secured with copper clout headed nails driven into the battens or with approved non-corrodible tile clips and nails in accordance with the manufacturer's instructions. Where nail holes in tiles have been cut off at hips, valleys, top edges, etc., new holes are to be drilled.

All ridge and hip cappings are to be of the types specified and of colour to match the roofing tiles. The cappings are to be bedded, jointed, pointed and torched up over roofing tiles in 1:3 cement mortar tinted to match the tiles. Where cappings having butt jointed ends are specified, an approved damp proof course conforming to Type C of SABS Specification 952 is to be fixed under, laid over the roofing tiles in accordance with the manufacturer's instructions. Barge cappings are to be of the types specified and of colour to match the roofing tiles. The barge capping tiles are, unless otherwise specified, to be bedded, jointed, pointed and torched up over roofing tiles in 1:3 cement mortar tinted to match the tiles with every tile drilled and secured with copper clout headed nails to timber bargeboards or bearers (elsewhere measured).

RATES:-for roof tiling are to include for all necessary half tiles at verges and for all square cutting and waste at verges, abutments, top and bottom edges and to both sides of ridges.

Rates for cappings, etc., are to include for all short lengths, cutting and waste and fitting at intersections.

All measurements are net. No allowance has been made for laps.

CARPENTRY AND JOINERY

NOMENCLATURE OF TIMBERS: -Timber described as "softwood" is to be South African soft wood of the relevant type, grade, etc., specified.

The names used for imported timbers are those given in Supplement No.1 to SABS Code of Practice 02 under "Nomenclature of Standard Trade Names of Imported Commercial Timbers used in South Africa" and the Contractor is referred thereto.

TIMBER SIZES: --Sawn and wrot timbers are to be of the full sizes stated.

Where "out of" sizes have been shown for wrot timbers on the drawings, an allowance of 4 mm for each wrot face off the sizes shown has been made.

Doors, fanlights, sashes, manufactured boarding, plywood, veneers, etc., must be of the full thickness specified.

Where doors, door frames, fanlights and frames, sashes, windows and frames are measured as numbered items, the overall sizes are given to the nearest 10 mm.

Tolerances in nominal dimensions for imported timber shall not exceed the following: -

(a) For nominal dimensions up to 76 mm the actual dimension may be 2,5 mm under for each 25mm

(b) For nominal dimensions 76 mm and over the actual dimension may be 1,6 mm under for each 25 mm.

STORAGE OF TIMBERS: - Timber delivered to the site is to be properly stacked above ground, either on bearers or platforms under cover and protected from inclement weather.

ORDERS: -for timber are to be placed immediately after the Contract is signed, as the Contractor will be held responsible for any delay in delivery.

PRETREATMENT OF TIMBERS: - All permanent timbers installed in the building are to be treated against borer, cryptoterms, termites, and all wood-destroying agencies with an approved preventative, all in accordance with SABS Code of Practice 05.

Any surface subsequently exposed by cutting or planing must be touched up with the same preservative solution and rates are to include for all preservative required.

The Contractor is to obtain a certificate from the merchants supplying the treated timber, to the effect that the timber has been treated against wood -destroying agencies. The Director has the right to remove samples of the treated timber to have tests carried out by the Division of Entomology or any other Authority.

Temporary timber on the site, e.g. shuttering props, etc., must be free from wood-destroying agencies. Any timber so affected is to be immediately removed from the site.

Materials which do not comply with the above requirements or are in any way damaged or discoloured by the pretreatment must be replaced by the Contractor at his own expense, if so directed by the Director.

STRESS GRADING OF SOFTWOOD TIMBER: - The Mechanical Stress Grading of Softwood Timber (Flexural Method) shall be in accordance with SABS Code of Practice 0149.

STRUCTURAL TIMBER: - for carpentry is to be South African softwood in accordance with SABS Specification 563 and, unless otherwise specified, of Stress Grade V4, and branded accordingly. If it is necessary to use sizes that have to be re-sawn, these shall be regraded and stamped with the respective SABS stress grade mark. Unless this is done, timber which is re-sawn is no longer considered as complying with the specification and shall on no account be used.

BRANDERING AND BATTENS: - of cross-sectional size 50 x 50 mm and under shall be South African softwood in accordance with SABS Specification 653 and branded accordingly.

JOINERY AND SHELVEING: - Softwood for joinery and shelving shall be South African softwood in accordance with SABS Specification 1359 and branded accordingly. All timber for joinery is to be air or kiln-dried to a moisture content of approximately 12%.

STRUCTURAL LAMINATED TIMBERS: -are to be of the sizes detailed, wrot on all faces and are to be manufactured by an experienced fabricator to the approval of the Director.

Adhesives used must meet the requirements of the current BS 1204 for external use

The surface appearance of members shall be Class C (Constructional) or Class S (Selected) as defined in SABS Specification 876 and as stated in the items.

FINGER-JOINTED TIMBERS: - are to be manufactured in accordance with SABS Code of Practice 096-"The manufacture of finger-jointed structural timber".

Contractors wishing to use finger-jointed timber must supply a guarantee that the fingerjointing complies with the above Code of Practice and that the glue is suitable for the particular member.

JOINTING OF PURLINS, FASCIAS, RAILS, BEAMS, ETC.: -shall, unless otherwise detailed, be as follows:

Purlins, slating battens, etc., of cross-sectional size 50 x 76 mm and under shall be jointed over the rafter. Larger sized purlins may be dealt with in the same way or by using some other suitable, recognised method. All purlins and battens shall be fixed to the supporting rafter by at least one nail skew driven from the direction of the ridge. Where the purlin or batten is fixed at more than 900 mm centres, at least two nails shall be used at every fixing point.

Fascias shall be jointed over rafters.

Beams, rails, etc., shall be jointed over a support or at 1/5th span with a recognised joint using bolts, etc.

Roof and floor plates are to be halved at joints, angles and intersections and nailed together.

Floor joists and bearers are to have splayed heading joints nailed together and staggered to occur over bearers and sleeper piers respectively.

Sawn bracing is to be butt-jointed at heading joints and angles and where wrot, is to have splayed heading joints and mitred angles over all points of support.

HARDWOODS: - (Red Meranti and Sapele) are to be best quality, specially selected and well seasoned, free from all sapwood to the approval of the Director and are to be well kiln-dried. Red Meranti is to be even in grain and colour, selected from "Standard and Better" grade from Malaysia-Sapele to be *Entandrophragma cylindrium* of F.A.S. grade.

PREFABRICATED TIMBER ROOF TRUSSES

Design: -The design of prefabricated roof trusses, bracing and secondary members forming part of the total timber roof construction shall be prepared by a professional structural engineer (Truss System Engineer) strictly in accordance with SABS Code of Practice 0163 for the Design of Timber Structures.

Wind and superimposed loadings are to comply with SABS Code of Practice 0160 and the superimposed loading, unless otherwise specified, is to be taken as that for inaccessible roofs.

Analysis: - From the configuration and mechanism shown on the tender drawings the Truss System Engineer shall submit, through the Contractor, to the Director detailed calculations and working drawings showing timber sizes, connections, truss dimensions, etc.

This submission must include details of both trusses and bracing as specified below: -

- (a) **TRUSSES:** The analysis of the truss system is to include diagrams of the trusses with marked up members and nodes showing dimensions, positions of supports and positions and values of applied loads, which, if not specified in the tender documents, must be derived from an approved source of reference which shall be indicated in the analysis. Due account must be taken of any eccentricity particularly at supports.

The analysis must also indicate allowable stresses, internal axial forces, moments and resulting stresses, as well as timber sizes and grades and detailed plate sizes and positions.

- (b) **BRACING:** Bracing must be designed to withstand the forces specified in SABS Code of Practice 0163 clauses 6 and 7.

If the bracing incorporates trusses, the additional forces must be shown in the analysis of the trusses.

The drawings must give all the information necessary for the construction of the bracing.

An outline of the bracing system, including temporary bracing must be shown on a working drawing giving clear details of fixings and anchorages into the supporting structure at wall plate level. Interference of bracing with truss members must be taken into account. Moments caused by forces applied between node points of bracing trusses and the axial forces must be given in the bracing calculations, also sizes and fixings of the bracing system.

Submissions: - A copy of letter reference TR1 (attached at the end of this document) completed and signed by the Truss System Engineer must be submitted by the Contractor at the same time as the list of Sub-Contractors. Two sets of calculations and drawings with pertinent erection instructions for the whole roof construction as presented by the Truss System Engineer must be submitted to the Director for consideration and permission to proceed.

This in no way absolves the Contractor of his responsibilities.

Any modifications to design or drawings are to be arranged directly between the Truss System Engineer and the Director. It will be the Contractor's responsibility to ensure that information is presented to the Director in good time and no claims will be entertained in respect of any delays resulting from the late approval of drawings, etc.

Any difference in cost between the roof system initially submitted by the Contractor and the finally accepted system to meet the original design requirements will be for the account of the Contractor.

The Truss System Engineer will be required to inspect the roof structure and certify on letter reference TR2 (attached at the end of this document) that the construction is in conformity with his design, and any costs in this respect must be included in rates for the truss system.

If, in the opinion of the Director, further visits are necessary due to errors or omissions on the part of the contractor or the Truss System Engineer the costs of these inspections will be for the account of the Contractor.

Fabrication and Storage: - Fabrication shall not commence until written permission has been given by the Director. The prefabricated roof trusses shall be manufactured, supplied and delivered to site by an approved manufacturer with all members accurately mitre cut, close butted and rigidly fixed together by approved galvanised metal spike connectors applied simultaneously to both sides of every joint by use of a mechanical press in accordance with SABS

Code of Practice 0163.

Permissible deviations in fabrication of trusses are to be as specified in SABS Code of Practice 0155.

The following will not be permitted at joints: -

- a) knots, splits or finger joints,
- b) varying member thicknesses,
- c) plates not fully pressed into timber,
- d) gaps between members exceeding 1,5 mm average over the width of the mitred members.

Stress grade marks must be clearly visible on all members.

Relevant dimensions must be checked on site before fabrication. Trusses must be stored off the ground and under cover both in the factory and on site.

Erection and Bracing: - Unless otherwise instructed, erection must be carried out as described, in "The Erection and Bracing of Timber Roof Trusses" published by the Truss Plate Association of South Africa Ltd. and the National Timber Research Institute-CSIR.

Where the overall length of trusses exceeds 13 m, complete braced bays are to be assembled on level ground and lifted into position suspended at maximum 3 m intervals from a spreader bar. Alternatively, braced bays may be assembled in position on a minimum of two lines of temporary intermediate supports below node joints. Temporary supports must be removed before roof covering is placed.

The erector must be suitably qualified and must satisfy the Director that he can meet the specification.

Where the roof incorporates a hipped end, the construction is to commence with the hip, otherwise erection is to be commenced with a fully braced bay.

Temporary bracing must be installed as erection proceeds in accordance with the accepted design.

The Contractor must notify the Director in sufficient time in order that an inspection may be made before the roof covering is placed.

The trusses will be subject to the following tolerances: -

- (a) maximum out of straight - length/400
- (b) maximum out of vertical at any point-height/200.

Rates:-The Contractor is to allow in his rates for the roof trusses for the design, manufacture, supply, hoisting and fixing of the roof trusses and permanent bracing, any necessary temporary bracing, and for the costs of all inspections by the Truss System Engineer.

Purlins or battens for roof coverings have been measured elsewhere. Rates for roof trusses are also to include for the exposed rafters at eaves overhangs to be wrot all round and trimmed and splay cut as required.

CORRUGATED ASBESTOS CEMENT ROOFING, CLADDING AND FITTINGS:-are to be of an approved brand conforming to SABS Specification 685.

Roofing, etc., shall be lapped half a corrugation at sides and 300 mm at ends, unless other-wise specified. Roofing, etc., shall be fixed to timber purlins, rails, etc., unless other specified, with standard galvanised drive screws 120 mm long and to steel purlins, rails, etc., with 8 mm galvanised hook bolts of the lengths stated. Each fixing screw or bolt shall be fitted with washers as recommended by the roofing manufacturer and shall be spaced not less than two screws or bolts to the width of each sheet to each purlin or rail.

Rates for roofing, cladding and fittings are to include for: -

- a) Fixing as described and in accordance with the manufacturer's instructions.
- b) Bedding washers in an approved mastic sealing compound.
- c) Coating projecting ends of hook bolts and nutswith bitumen after fixing.
- d) All square notches, square cutting and waste, laps, fitting, mitring and drilling. No punched holes will be permitted.

All measurements are net. No allowance has been made for laps.

CORRUGATED IRON ROOFING, CLADDING AND FITTINGS: - are to be of an approved brand and are to be manufactured from galvanised steel sheets of the thickness specified after galvanising and having a galvanised coating of "Iscor Coating Designation Z275" for inland areas and "Z600" for coastal areas as specified.

Roofing, etc., shall be lapped one and a half corrugations at sides and 300 mm at ends, unless otherwise specified.

Roofing, etc., shall be fixed to timber purlins, rails, etc., with standard galvanised drive screws 65 mm long and to steel purlins, etc., with 8 mm galvanised hook bolts of the lengths stated.

Each screw or bolt shall be fitted with one lead washer and one bituminous felt washer and shall be spaced not less than one screw or bolt to every alternate corrugation across the width at end laps and ends of sheets and at each intermediate purlin or rail.

Rates for roofing, cladding and fittings are to include for: -

- a) Fixing as described.
- b) Bedding washers in an approved mastic sealing compound.
- c) Coating projecting ends of hook bolts and nuts with bitumen after fixing.
- d) All square notches, square cutting and waste, laps, fitting and drilling.

All measurements are net. No allowance has been made for laps.

FLUTED STEEL ROOFING, CLADDING AND FITTINGS: - are to be approved galvanised fluted steel sheets and fittings manufactured from galvanised steel sheets of the thickness specified after galvanising.

(a) Galvanised steel sheets and fittings: - are to be manufactured from galvanised steel having a galvanised coating of "Isacor Coating Designation Z275" for inland areas and of "Z600" for coastal areas as specified, with the sheets having a plain galvanised finish and the fittings an embossed galvanised finish

Roofing, etc., shall be fixed to timber purlins, rails, etc., with standard drive screws of the lengths stated and to steel purlins, rails, etc., with 8 mm galvanised hook bolts of the lengths stated. Each fixing screw or bolt shall be fitted with washers as recommended by the manufacturer of the roofing.

Vertical cladding shall be fixed with broad flutes externally, unless otherwise described, to timber rails with standard galvanised drive screws 50 mm long and to steel rails with 6 mm diameter x 25 mm long galvanised sheet bolts. Each fixing screw or bolt shall be fitted with washers as recommended by the manufacturer of the cladding including drilling steel rails as necessary.

(b) Baked enamel finished galvanised steel sheets and fittings: - are to be manufactured from unpasivated galvanised steel having a galvanised coating of "Isacor Coating Designation Z275", and finished, where described in the items, with approved factory applied baked enamel finish of colours to be selected by the Director.

Roofing, etc., shall be fixed to timber purlins, rails, etc., with sherardised or stainless steel drive screws of the lengths stated and to steel purlins, rails, etc., with 8 mm diameter sherardised or stainless steel hook bolts of the lengths stated. Each fixing screw or bolt shall be fitted with washers as recommended by the manufacturer of the roofing.

Vertical cladding shall be fixed with broad flutes externally, unless otherwise described, to timber rails with sherardised or stainless steel drive screws 50 mm long and to steel rails with 6 mm diameter x 25 mm long sherardised or stainless steel sheet bolts. Each fixing screw or bolt shall be fitted with washers as recommended by the manufacturer of the cladding including drilling rails as necessary.

(c) Generally: - where sheet lengths are in excess of 12 m these have been measured separately.

Roofing, etc., shall be lapped one flute at sides and 230 mm at ends unless otherwise specified.

Fixings to roofing sheets are to be spaced one every crest along purlins at top and bottom edges of roof slopes and one to every alternate crest along intermediate purlins. Fixings to vertical cladding are to be spaced one to every alternate trough to each rail.

Fittings, unless otherwise specified, are to be lapped a minimum of 150 mm and where necessary are to be drilled for and fixed with the fixings securing the roofing and cladding sheets.

Rates for roofing, cladding and fittings are to include for: -

- (a) Fixing as described and in accordance with the manufacturer's instructions.
- (b) Seam bolting all side laps at not exceeding 450 mm centres with 6 mm diameter x 25 mm long sheet bolts or with 20 mm x No.14 self-tapping screws and each screw or bolt is to be fitted with washers as recommended by the manufacturer of the roofing.
- (c) Fixing of fittings where described as fastened to roofing, cladding, etc., with approved pop rivets spaced at not more than 340 mm centres
- (d) Sealing side and end laps of sheeting and end laps of fittings with one continuous strip of approved 5 mm diameter preformed flexible sealant strip.
- (e) Coating the exposed heads of fixings and fasteners to baked enamel finished materials and cut edges of sheets and fittings with matching touch-up compound supplied by the manufacturer of the sheeting and in accordance with his instructions.
- (f) All square notches, square cutting and waste, laps, fitting and drilling. No punched holes will be permitted.
- (g) Taking special care at all times to prevent damage to the finished surfaces of the baked enamel finished materials.

All measurements are net. No allowance has been made for laps.

FLUTED ALUMINIUM ROOFING, CLADDING AND FITTINGS: - are to be approved mill finish aluminium sheeting and fittings conforming to SABS Specification 903.

The sheeting is to be manufactured from 3103-R8 aluminium and the fittings from 1200-H4 aluminium, unless otherwise specified, and of the thickness specified.

Roofing, etc., shall be fixed to timber purlins, rails, etc., with aluminium drive screws 90 mm long and to steel purlins, rails, etc., with 8 mm diameter aluminium hook bolts of the lengths stated. Each screw or bolt is to be fitted with washers as recommended by the manufacturer of the roofing.

Vertical cladding shall be fixed with broad flutes externally, unless otherwise described, to timber rails with aluminium drive screws 50 mm long and to steel rails with 6 mm diameter x 25 mm long aluminium sheet bolts. Each fixing screw or bolt shall be fitted with washers as recommended by the manufacturer of the cladding including drilling steel rails as necessary.

Where sheet lengths are in excess of 12,5 m these have been measured separately.

Roofing, etc., shall be lapped one flute at sides and 230 mm at end,

Fixings unless otherwise specified, to roofing sheets are to be spaced one every crest along purlins at top and bottom edges of roof slopes and one to every alternate crest along every intermediate purlin. Fixings to vertical cladding are to be spaced one to every alternate trough to each rail.

Fittings, unless otherwise specified, are to be lapped a minimum of 150 mm and where necessary are to be drilled for and fixed with the fixings securing the roofing and cladding sheets.

Rates for roofing, cladding and fittings are to include for: -

- (a) Fixing as described and in accordance with the manufacturer's instructions.

- (b) Painting both surfaces of all laps with one coat of approved bituminous aluminium paint.
- (c) Seam bolting side laps at not exceeding 450 mm centres with 6 mm diameter x 20 mm long aluminium sheet bolts or with 20 mm X No.14 aluminium self-tapping screws. Each bolt or screw shall be fitted with washers as recommended by the manufacturer of the roofing.
- (d) Fixing of fittings where described as fastened to roofing, cladding, etc., with sheet bolts or self-tapping screws as above described and spaced at not more than 250 mm centres.
- (e) Sealing all side and end laps of sheeting and all end laps of fittings with one continuous strip of approved 20x7 mm preformed flexible sealant strip.
- (f) All square notches, square cutting and waste, laps, fitting and drilling. No punched holes will be permitted.

All measurements are net. No allowance has been made for laps.

BOARD AND STRIP FLOORING: - Softwood flooring is to be in accordance with SABS Specification 629 with splayed or end-matched heading joints as specified.

Hardwood flooring is to be in accordance with SABS Specification 281 with splay-type tongues and grooves, unless otherwise specified, with end-matched heading joints.

Flooring is to be stacked on site for at least fourteen days before being fixed and shall be well protected from the weather.

Flooring is to be secret nailed to joints with cut flooring brads, and splay-type heading joints are to occur over points of support. All heading joints are to be well staggered and flooring is to be neatly fitted against adjoining floors, thresholds, etc., all in accordance with SABS Code of Practice 043.

Rates for flooring are to include for cleaning down to a smooth even surface with a sand- p ape ring machine and all square notches, square cutting and waste and, unless otherwise specified, sealing with a coat of approved wax polish well rubbed in.

INSULATION MATERIAL FOR CEILINGS: - shall be resin bonded glass wool or mineral wool thermal insulation blanket complying with SABS Specification 1381 of the thickness specified, delivered to the site in unopened rolls in its original factory wrappings.

INSULATION, WATERPROOFING AND DUSTPROOFING MATERIAL FOR ROOFS:-shall be an approved aluminium foil faced both sides laminated kraft paper and synthetic reinforced material fixed in accordance with the manufacturer's instructions, lapped 150 mm at all edges unless otherwise specified.

GYPSUM PLASTERBOARD: - is to be in accordance with SABS Specification 266.

GYPSUM COVERED CORNICES: - are to be in accordance with SABS Specification 622.

ASBESTOS CEMENT SHEETS: - are to be in accordance with SABS Specification 685.

ASBESTOS CEMENT CELLULOSE SHEETS: - are to be in accordance with SABS Specification 803.

HARDBOARD: - is to be in accordance with SABS Specification 540. Tempered and untempered hardboard is to be conditioned in accordance with the manufacturer's instructions before fixing in position.

VENEERS: - All decorative face veneers are to be selected kiln dried of best quality of the respective timbers, free from knots, cracks, patchwork, sap wood and other defects and bonded under heat and hydraulic pressure with water-resistant synthetic resin adhesive.

Commercial veneers are to be selected rotary cut hardwood veneers and otherwise as described above.

PLYWOOD: - is to be long grain three- or five-ply type manufactured with hardwood veneers with selected face veneers as described, bonded under heat and hydraulic pressure with water-resistant synthetic resin adhesive and sanded to a smooth finish.

UNVENEERED CHIPBOARD: - is to be controlled density composite wood/resin boarding bonded under heat and hydraulic pressure complying with SABS specification 1300.

VENEERED CHIPBOARD: - is to be long grain three-ply boarding with controlled density composite wood/resin chipboard core faced on both sides with selected veneers as described, bonded under heat and hydraulic pressure with water-resistant synthetic resin adhesive and sanded to a smooth finish.

BATTENBOARDING:- is to be long grain three-ply boarding manufactured with kiln-dried South African softwood core formed of laminations not exceeding 45 mm wide and faced on both sides with selected veneers as described, bonded under heat and hydraulic pressure with water-resistant synthetic resin adhesive and sanded to a smooth finish.

BLOCKBOARD: - is to be long grain five-ply boarding manufactured with kiln-dried South African softwood core

formed of laminations not exceeding 35 mm wide crossbanded on both sides with hardwood veneers and faced on both sides with selected face veneers as described; bonded under heat and hydraulic pressure with water-resistant synthetic resin adhesive and sanded to a smooth finish.

DECORATIVE LAMINATE LININGS: - are to be 1,2 mm thick approved general purpose quality high pressure decorative melamine laminate sheeting with satin finish and of selected colours and patterns, and rates are to include for all square cutting and waste and square notchings, close cut and mitred external angle intersections where required, and for bonding to the timber backings with an approved adhesive in accordance with the manufacturer's instructions.

The linings are to be cut out of single sheets to obviate joints but where joints are unavoidable the sheets are to be butted to form a tight inconspicuous joint.

NAILS AND SCREWS: -Mild steel nails are to be in accordance with SABS Specification 820. Mild steel and brass screws are to be round headed, countersunk, etc., as appropriate and are to be in accordance with SABS Specification 1171. Nails and screws shall be of the size, length and type appropriate to their respective uses.

PLUGS, ETC.: -Where items of woodwork are described as "plugged", these may be nailed to timber plugs or slips built into the structure, and where described as "plugged and screwed" these may be screwed to timber or approved patent fixing plugs.

SHOT FIXING: - Where items of woodwork are described as "shot fixed" these are to be fixed with an approved cartridge-assisted tool, and rates are to include for all nails, spikes, blanks, washers, cartridges, etc.

CARPENTRY: -Timbers are to be the best of their respective kinds, free from sap, shakes, large, loose or dead knots, warty edges and other defects and thoroughly seasoned. Wrot surfaces are to be finished clean, smooth and free from tool marks.

Timbers shall be in as long lengths as possible.

Rates for sawn and wrot structural timbers are to include for notching, splay and birdsmouth cutting, housing, halving, scarfing, cutting timbers to the required lengths, spiking and clinching and for hoisting and fixing timber in position.

CEILINGS: - are to be of the types described, fixed to timber bracing, bearers, etc., as described and with panels set out so as to give even width panels not less than half a sheet wide at edges.

FLUSH PLASTERED CEILINGS: - are to be formed of gypsum plaster board of the thickness stated, generally in 1200 mm widths and long lengths, fixed grey side down to timber bracing, bearers, etc., as described, with butted joints between the boards covered with 65 mm wide strips of galvanised wire scrim fixed along both edges, including all square notches and square cutting and waste, and the ceiling finished with two coats of approved retarded hemihydrate gypsum plaster applied in accordance with the manufacturer's instructions to a finished thickness of not less than 6 mm, including pressing into scrim over joints and finished to a smooth polished surface.

SUSPENDED CEILINGS: - are to be of the types described and inclusive of their component parts must be of sufficient strength to perform the function for which they are to be used, manufactured from best quality materials and conform to the requirements of the Fire Master. The exposed surfaces of all ceiling panels and supporting members are to be uniform in colour and free from surface blemishes.

Hangers are to be galvanised and are to be at suitable centres to meet the requirements of the specification, each with one end fixed to the suspension grid main bearers and the other end fitted with suitable galvanised fixing cleat fixed to the structure. Fixing points must be agreed to by the Director before any power shot fixings are made. Hangers must not be suspended from air-conditioning ducts.

Component parts and fixings other than aluminium must be non-corrosive and able to withstand atmospheric pollution. Surfaces of aluminium which are in contact with other materials when fixed, particularly ferrous metals, are to be suitably insulated to prevent electrolytic corrosion.

All work is to be executed by specialists in accordance with the manufacturer's instructions, and to the approval of the Director.

Rates for ceilings are to include for hangers, suspension systems, ceiling panels, for constructing the ceilings in a manner suitable for carrying air conditioning diffusers and light fittings in the positions required, for setting out the ceilings to layouts approved by the Director, for all non-standard size panels, for modifications to standard suspension systems as necessary to work around any air-conditioning ducts or pipes or light fittings, for all necessary square cutting and waste, notching and fitting around projections, columns, etc.

Exposed tee-system suspended ceilings: - are to be of the type described with main tees and cross tees spaced at the required centres to suit the sizes of panels used, with the cross tees fitted between and notched to form a flush fit with main tees unless otherwise described.

Main and cross tees shall be holed as necessary and provided with timber wedges or steel clips to prevent ceiling panels from lifting.

Concealed tee-system suspended ceilings: - are to be of the type described with main and cross tee section bearers spaced at the required centres and all properly fitted together at intersections.

ALUMINIUM TRIMS TO CEILINGS: - are to be of extruded aluminium of 6063-TF or equivalent quality and temper, of the sections described. Anodised trims are to be of the colour stated.

Rates are to include for all cutting, fitting at intersections, mitres, etc., and rates for items described as fixed with screws are to include for countersunk drilling and fixing with approved countersunk stainless steel screws.

FLUSH DOORS: - Hollow core, semi-solid and solid laminated flush doors are to be of approved manufacture complying with SABS Specification 545.

The doors are to be finished on both sides facing veneers specified and concealed on both stiles, unless otherwise specified, with hardwood edge strips and where doors are required to receive a transparent finish, the edge strips are to match the facing veneers.

Doors with rebated meeting stiles are to have edge strips to the meeting stiles not less than 19mm thick.

Each door or leaf of double door, described as hung to swing, is to be fitted with necessary hardwood reinforcing blocks for bottom shoe and top centre of spring hinge.

Unless otherwise specified, all flush doors are to be interior quality, but, where exterior doors are specified, the glue used must comply with Type WBP of B S 2304.

FRAMED, LEDGED AND BRACED BATTEN DOORS, ETC.: -Doors described as filled in with V-jointed boarding are to be filled in flush on one side with tongued and grooved vertical boarding, V-jointed on one or both sides and of the thickness stated. The boarding is to be in narrow widths, closely cramped up, rebated on outer edge and housed to grooves in stiles and rails and twice brass countersunk screwed at each intersection.

Ledges and braces and inner edges of the abutting stiles and rails are to be chamfered to form a V-joint at junction with the boarding.

JOINERY: - All timbers shall be in as long lengths as possible. Lengths for joinery shall be single where possible and where joints are unavoidable, they shall be made as inconspicuous as possible.

Timber for grounds, firrings, blocks, plugs, etc., shall be sound and free from defects.

All joinery work is to include for work in connecting by mortice and tenon, dovetailing, housing, flush pinning, etc., as may be by required and for all screws, nails and glueing together and for sinking flush all exposed screws unless otherwise specified.

Wrot surfaces and edges are to be steel scraped and sandpapered before and if necessary, after fixing.

Edges are to be arris rounded unless specified to be angle rounded.

"Arris rounded" denotes that the sharp edges are slightly rounded off and that no mitring is required.

"Angle rounded" denotes rounded from 3 mm to 10 mm radius and is to include for housed and mitred joints.

Hardwood doors, frames, jamb and soffit linings, etc., are to be treated on all surfaces with one coat of approved sealer before building in, etc., and rates for these items must include for this. Batten doors with tongued and grooved battens are to have the tongues and grooves well sealed before assembling. The sealer used shall be compatible with the finishing coats to be applied.

Horns of door frames are to be checked and splayed back where frames are fixed projecting or flush with surface and built in.

Where doors, fanlights or sashes are described as hung to butts on steel or aluminium frames, rates are to include for supplying necessary steel, brass or stainless steel screws.

Panel work is to be secured to the grounds, etc., with screws concealed behind the mouldings or by sinking the screws and pelleting as directed.

Joinery is to be framed up, but not glued or wedged, immediately the order is given to commence work. Wherever possible, joinery shall not be placed or fabricated in position until the plaster has dried out. Reasonable tolerance shall be provided at all connections between the joinery and building carcass so that any irregularities, settlements or other movements shall be adequately compensated. All joinery shall be accurately scribed to fit the contour of any irregular surface. Should the joints of any joinery open or give, such defective work is to be taken down, refitted and redecorated or replaced by new joinery at the Contractor's expense.

Only brass screws may be used for hardwood joinery.

The Contractor is to allow for cross-tonguing all solid wood sections unobtainable in single widths.

No joinery is to be primed until it has been inspected and approved by the Director.

All joinery liable to injury must be protected to the satisfaction of the Director. Rates must include for this temporary protection.

Rates for timber frames, mullions transoms, linings, standards, rails, fascias, cornices, skirtings, beads, picture rails, etc., are to include for mitres, etc.

Rates for all items of timber are to include for fixing and planting on as may be required with necessary panel pins or nails.

DEMOUNTABLE PARTITIONS: - are to be of an approved system of standard construction, with an average sound rating of not less than 30 decibels taken over the whole face area.

Framing is to be natural finish anodised aluminium comprising posts at 1200 mm centres, unless otherwise described, with transom rails where specified, fitted between the posts, a rail against ceiling and an aluminium standard skirting on each side at base, all neatly and securely fixed together.

Intermediate posts are to be fitted with vinyl feature strips of approved colour.

Provision is to be made at the base of the partitions and in the ceiling rails and posts for electrical wiring, which will be installed under the electrical sub-contract, and the ceiling rails and end posts are to be fitted with continuous removable access plates.

Solid panelling is to be approved solid chipcore panels of the thickness specified faced on both sides as described in the items.

Glazed panels are to be glazed as required, complete with all necessary natural finish anodised aluminium glazing

beads and vinyl glazing strips.

Louvre panels where specified are to be approved natural finish anodised aluminium adjustable louvre sets each comprising head and cill weather bars and two jamb strips each fitted with louvre brackets with spring loaded clips for and fitted with and including louvres as required and complete with tilt bars and operating lever handles. Where the openings are not the correct size to suit a full number of standard width louvre blades an alternate head weather bar must be provided to suit a fixed louvre blade of the required width. The louvre sets are to be fitted with the jamb strips positioned horizontally so that the louvres will be fixed vertically.

Partitions are to be in 1 200mm modules, unless otherwise specified, except at ends where the odd lengths are to be made up by a narrow panel at one end of the partition.

Ends of partitions against walls, window frames, etc., and the top edge of partitions against ceilings are to be fitted on both sides of partition with approved vinyl scribing sections fitted between the structure and the end post or top rail of the partition.

Plain openings are to have aluminium frames similar to door openings neatly fitted into the framing.

Doors are to be solid laminated flush doors complying with SABS Specification 545. The doors are to be finished on both sides with veneer as described in the items and concealed on both stiles with matching hardwood edge strips.

Where doors are described as having observation openings, these openings are to be of the sizes stated, glazed as specified with all edges bedded in approved neoprene gaskets and fixed with 10 x 25 mm wrot matching hardwood rebated glazing beads mitred round and bradded to both sides.

Rates for doors are to include for all necessary additional aluminium framing to form door openings, and for hanging the doors on and including one and a half pairs of 102 mm satin chrome finish brass hinges to each door.

All locks to doors in demountable partitions are to be supplied with two keys, and are to be controlled by the same master key as the mortice locks used elsewhere in the Contract.

Unless otherwise specified all veneered solid panelling and doors are to be finished as follows: -

Prepare, stop with tinted stopping, apply an approved stain as necessary to achieve uniform colour appearance, and three coats of approved clear matt polyurethane finish including burnishing with steel wool between coats.

Rates for demountable partitions are to include for supplying, assembling, erecting, finishing, glazing and fixing complete between finished surfaces of concrete floors, plastered walls and ceilings, and all in accordance with the manufacturer's instructions.

All work is to be executed by a firm specialising in this type of work and all to the approval of the Director.

FLOOR COVERINGS, PLASTIC LININGS, ETC.

HARDWOOD BLOCK FLOORING:- is to comply with SABS Specification 281.

WOOD MOSAIC FLOORING: -is to comply with SABS Specification 928.

FLOOR TILES AND SHEETING: -are to be of the composition, type, size and thickness specified with colour, pattern, graining, etc., consistent throughout, all to the approval of the Director.

Thermoplastic floor tiles: - with a bituminous or resinous binder are to comply with SABS Specification 586.

Semi-flexible vinyl asbestos floor tiles or sheeting: - are to comply with SABS Specification 581. **Fully-flexible vinyl**

floor tiles or sheeting: - are to comply with SABS Specification 786.

Where the specified sizes and/or thicknesses of floor tiles and sheeting differ from those in the SABS Specifications, such items of floor tiles and sheeting shall comply in all other respects with the relevant SABS Specifications.

ANTI-STATIC WELDED VINYL TILE FLOORING: - is to be of an approved manufacture and of the size and thickness specified with colour, pattern, graining, etc., consistent throughout all to the approval of the Director, and is to be laid with the joints welded together to form a seamless floor, impervious to water. The tiles are to be sealed down with an approved conductive adhesive all in accordance with the manufacturer's instructions.

Anti-static welded tile flooring is to be laid by specialists to the approval of the Director, and is to conform to SABS Code of Practice 051 for the Prevention of Explosive and Electrical Hazards in Hospitals.

The Contractor is to carry out tests on all anti-static floors at completion to ensure that the resistance of the flooring conforms to SABS Code of Practice 051. Should the floor not comply with the Code of Practice the Contractor will be required to make the necessary rectification at his own expense to ensure compliance.

In this connection the Contractor is advised to allow for laying a sample panel size approximately 1 800 >< 1 800 mm where directed, for testing, on site prior to the laying of floors.

SKIRTINGS, STAIR NOSINGS, EDGING STRIPS, ETC.: -are to be of the types and sizes specified and are to be of approved manufacture.

CARPET TILES AND SHEETING: - are to be of the types specified and of approved colours and patterns all to approval of the Director.

LAYING:- All floor coverings, wall linings, etc., are to be laid by workmen experienced in laying the particular type of floor covering, wall lining, etc., in strict accordance with the instructions issued by the manufacturer of the materials being used and to the approval of the Director.

All adhesives used must be the correct adhesives as supplied or recommended by the manufacturer of the material being used.

The floor coverings, wall linings, etc., are, except where otherwise specified, to be laid on cement screeds or plaster backings, All cement screeds and plaster or other backings have been measured elsewhere.

Tiles are to be laid with close butt joints and to approved patterns with no cut tiles less than half a tile wide and tiles are to be fully bonded to the backing surfaces.

Sheeting is to be cut to fit the areas accurately and neatly and is to be so disposed as to have a minimum number of seams set out to the approval of the Director and all seams are to be perfectly tight and practically invisible. No piecing of short ends will be allowed. The sheeting is to be fully bonded to the backing surfaces and is to be rolled as necessary to remove all air bubbles and to ensure completion adhesion.

Welded sheet flooring or wall linings are to have the seams welded together by approved process to form a seamless floor or lining.

Patterned sheet flooring or wall linings are to be matched at joints.

Vinyl skirtings, stair nosings, edging strips, etc. are to be fully bonded to the backing surfaces.

Wood block and wood mosaic flooring is to be laid in accordance with SABS Code of Practice 043.

CLEANING, ETC. - All floor coverings are to be cleaned down to the approval of the Director. Cleaning of thermoplastic, vinyl and similar floor coverings shall, unless otherwise stated, be done with an approved waterbound floor stripper in order to achieve a standard of cleanliness acceptable to the Administration. Any foreign matter such as paint, stain, tar, etc., which may not respond satisfactorily to the cleaning process shall be removed by means of a scraper, steel wool, etc.

Wood block and wood mosaic finishes are to be sanded to a smooth even surface with a sandpapering machine, sealed with one coat of penetrating sealer and finished with a coat of approved wax polish well rubbed in.

METALLISED FLOOR DRESSING:- where specified, vinyl sheet flooring and floor tiles shall be cleaned down with an approved water-based floor stripper, and finished with two coats of an approved sealer and two coats of an approved metallised floor dressing applied in accordance with the manufacturer's instructions.

RATES:for all floor coverings are to include for laying as described, for cleaning down backing surfaces before laying and for all square and raking cutting and waste and fitting, fair cutting at edges where no skirtings occur, protecting from injury, and for cleaning down, etc., as described, at completion.

Rates for all wall finings are to include for laying as described, cleaning down backing surfaces before laying, sizing backing surfaces if necessary to ensure proper adhesion, all square and raking cutting and waste and fitting, fair

cutting at exposed edges, bending at angles and for all narrow widths and protecting from injury and cleaning down, etc., as described, at completion. Wall linings in widths not exceeding 300 mm to returns, reveals and the like have not been measured separately, but have been included in the area of the general items of wall linings and rates must include for this.

Rates for skirtings, stair nosings, edging strips, etc., are to include for fixing as described, cutting to lengths, fitting at intersections, mitres, ends, etc., and for cleaning down at completion.

IRONMONGERY

Ironmongery is to be to the approval of the Director and rates are to include for fixing with screws of corresponding metal and finish and for oiling and easing as required at completion.

Where catalogue references are given, the articles are to be of the brand specified or other approved.

No two-lever mortice locks are to be used.

Mortice locks, cylinder locks, cupboard locks, etc., are to differ so that no key will pass a second lock, unless otherwise specified.

Where mortice locks, cylinder locks, etc., are specified to be "en-suite" they are to be made "en suite" in the specified number of "suites". The "suites" are to be controlled by differing sub-master keys with a grand master key controlling all "suites", and no sub-master key is to pass any lock of another "suite".

All locks are to be fitted with two keys and the locks are to be stamped with consecutive numbers and the keys to each are to be stamped to correspond with the lock.

Items of ironmongery specified as chromium plated or satin chrome finish are, unless otherwise specified, to be chromium plated or satin chrome finish on solid brass.

Items of ironmongery specified as aluminium are to be natural anodised.

Where items of ironmongery are specified as fixed to pressed steel door frames, the Contractor is to ensure that the suppliers of the steel frames prepare the frames for all keeps and do all morticing and drilling required and receive all information necessary regarding ironmongery. Preparation of steel door frames for ironmongery has been measured elsewhere.

Where items of ironmongery are described as "plugged and screwed" these are to be screwed to patent fixing plugs of approved manufacture, and this shall include for plugging and screwing to brickwork or concrete.

Key tags are to be 40 mm diameter x 3 mm thick plaster of approved colour, engraved on face with the required number of letters and numerals finished in an approved colour, and the tag is to be holed for and fitted with a steel split ring and fixed to key.

Engraved plastic door signs and numeral plates are to be of 5 mm thick clear plastic with square polished edges all round with an approved coloured background and sans-serif letters and numerals as described in the items, reverse engraved in the plate with splayed sides and flat reading face and finished in an approved contrasting colour. Each sign is to be twice drilled for and fixed to softwood or hardwood, unless otherwise described, with chromium plated round headed brass screws. Unless otherwise described, the signs are to be 50 mm high with 30 mm high engraved letters or numerals and are to allow a minimum margin of 25 mm at both ends. All signs are to be equal to sample to be submitted to and approved by the Director.

Pictorial plastic signs are to be of 5 mm thick clear plastic of the sizes stated in the items with square polished edges all round and with the silhouette described in the items applied to the back of the plate by means of the silk screen process in an approved colour and the whole back of the plate finished in an approved contrasting colour. Each sign is to be four times drilled for and fixed to soft wood or hardwood, unless otherwise described, with chromium plated round headed brass screws. All signs are to be equal to sample to be submitted to and approved by the Director.

STRUCTURAL STEELWORK

GENERALLY: -The fabrication, assembly and erection of structural steelwork is to be executed in accordance with SABS Specification 1200H - Structural Steelwork (a copy of which the Contractor will be required to keep on site so that it can be referred to at all times during the Contract) with the following amplifications and amendments: -

INTERPRETATIONS:-Clauses 2.1 and 2.2 refer. This preamble, together with any other supplementary preambles appearing in these Bills of Quantities shall be deemed to be the project specification and are the "Portion 2" referred to in Clause 2.2.

DEFINITIONS:-Clause 2.3 of SABS Specification 1200H refers. All references to the Engineer shall be deemed to mean the Director.

SUB-CONTRACTORS: -The Contractor shall either (a) have adequate satisfactory and approved experience in this type of work or (b) employ an approved specialist structural steelwork Sub-Contractor. The Contractor, in the case of (a), or the specialist Sub-Contractor, in the case of (b), shall employ at all stages of the Works both on and off site a competent Supervisor experienced in the work.

MATERIALS: - Unless otherwise shown on the drawings or hereunder, all rolled sections shall be hot rolled mild steel, and all materials shall comply with one of the following: -

- a) Weldable Structural Steels to BS 4360.
- b) Hollow sections to BS 4848 Part 2 and BS 6323.
- c) Cold rolled sections to BS 2994.
- d) Black bolts and nuts to SABS 135.
- e) Precision bolts and nuts to SABS 136.
- f) High-strength friction-grip bolts and nuts to SABS 1282.
- g) Flat and tapered washers to SABS 1149.
- h) Electrodes for welding to SABS 455.

SHOP DETAIL DRAWINGS: -The Contractor shall prepare shop detail drawings, in conformity with the details shown on the structural steelwork drawings and to show all information necessary for complete fabrication, assembly, erection and painting. In the preparation of the shop detail drawings the Contractor is to comply with the requirements of SABS Code of Practice 0162. The cost of preparing all necessary shop detail drawings and copies thereof is to be allowed for by the Contractor in his rates.

The Contractor shall submit two copies of his shop detail drawings to the Director for approval at least 10 days before fabrication of the member concerned is due to commence. Such approval does not imply that a complete and comprehensive check of the detail drawings has been carried out, and the Contractor shall remain responsible for ensuring that the steelwork is correctly fabricated, assembled, erected and painted.

SUBSTITUTION OF SIZES, ETC.: -No substitution of sizes or joints additional to those shown on the drawings shall be made without the prior approval of the Director. Except in cases of proven non-availability of materials specified, any additional costs involved due to substitution shall be for the Contractor's account.

FIXINGS: -The positions and manner of fixing the hangers for suspended ceilings, airconditioning ducts, pipe installations, etc., to the structural steelwork are to be approved by the Director before work on such installations commences.

FABRICATION, ASSEMBLY AND ERECTION

Welding: - shall be carried out in accordance with SABS Code of Practice 044 and the relevant recommendations of SABS Code of Practice 0162 and BS 5135, and in any case of conflict, the SABS Codes of Practice shall be deemed as binding. All welders employed on the Works shall be currently classified at least as grade 2 welders as defined by SABS Code of Practice 044. Should the Director so request, proof of the classification shall be produced.

Unless otherwise specified all welds are to be continuous fillet welds of 6 mm leg length or not less than the thinnest plate or section being welded.

Handling, Storage and Erection: - of members is to be undertaken in such a manner to prevent overstress or damage. Should overstress or damage occur, the Director shall be informed and his instructions sought.

Storage shall be arranged such that damage to applied finishes is prevented.

All plant and equipment used in the erection of structural steelwork shall be adequate in every respect. The Contractor shall allow in his rates for all necessary temporary bracing, and for maintaining and finally removing such temporary bracing.

Fixing of Bolts, etc.: -Unless approved by the Director, no pre-drilled fixings for bolts, etc., will be permitted through hollow section members. Any hollow section member that has been drilled or punctured in any way shall be considered condemned and must be replaced to the satisfaction of the Director.

INSPECTION AND TESTING

Facility for Inspection: - The Contractor shall afford to the Director all reasonable access to inspect the steelwork at any stage of its fabrication, and shall give due notice before delivery of steelwork to the site to allow inspection and tests to be conducted if so required by the Director.

Cost of Tests: - The cost of all tests required by the Director shall be borne by the Administration, except that the costs of the following tests shall be borne by the Contractor: -

- (a) Testing of welders and equipment
- (b) Such tests (including load tests) as may be necessary by failure on the part of the Contractor to meet the

requirements of the specification.

Procedure in the Event of Failure: - In the event of a failure of a test, the Contractor shall either replace the defective item or prove its sufficiency by means of a load test carried out in accordance with Appendix B of Chapter 6 of the South African Standard Building Regulations. If so required by the Director the Contractor shall also demonstrate by means of tests at his own cost that all like members meet the requirements of the Specification.

PRIMING OF STRUCTURAL STEELWORK

General

(a) Painting conditions.

No painting shall be undertaken when one or more of the following conditions exist: -

- i) the atmospheric or steel temperature is below 10 °C,
- ii) the atmospheric or steel temperature is expected to fall below 7 °C before the paint is dry,
- iii) the atmospheric or steel temperature is high enough to cause damage to the paint film,
- iv) in fog or mist,
- v) the relative humidity is greater than 90 %,
- vi) surfaces are or will be wet or damp from rain or other causes,
- vii) surfaces are contaminated by dirt, dust, grease, oil or other matter detrimental to painting,
- viii) wind will deposit dust onto undried surfaces.

(b) Extent of shop painting.

All surfaces shall be primed as described in the shop except: -

- (i) those to be encased in concrete which are to be left as prepared metal, unless otherwise specified
- (ii) contact surfaces of high strength friction-grip bolt connections which are to be left as prepared metal
- (iii) edges or faces yet to be welded which are to be left as prepared metal over sufficient width from the weld to avoid contamination of the weld or damage to the paint by the effect of welding.

(c) Paint identification, storage and preparation.

All paint shall be supplied in unopened original containers showing the manufacturer's name and trade mark, date of manufacture and the relevant SABS or other specification number.

No paint shall be used past its maximum life span but otherwise oldest paint shall be used first. Containers shall not be opened until required and opened containers shall be used before unopened containers.

Before use, paint shall be thoroughly stirred and prepared in accordance with manufacturer's instructions.

(d) Thinning.

No paint shall be thinned except strictly in accordance with manufacturer's instructions.

(e) Dry film thickness.

Where not specifically later stated this shall be in accordance with manufacturer's instructions for spreading rates.

A tolerance of approximately 10% of that thickness will be allowed.

(f) Touching-up surfaces. Surfaces shall be protected against damage, but should this occur, then the paint shall be rubbed down over the damaged and surrounding area to a sound surface and then restored by re-applying the removed coat properly feathered in with the existing. Upon completion of site connections, these connections shall be stripe painted with the specified primer before any further painting is carried out.

Class P1 Preparation and Priming Coat: - Unless otherwise specified, rates for structural steel-work are to include for Class P1 Preparation and Priming Coat as follows: -

- (i) Surfaces are to be cleaned in accordance with SABS Code of Practice 064 to remove all rust, scale, grease, oil, etc., endeavouring to bring the surface to a bright metallic condition, and painted, unless otherwise specified, with one coat of red oxide zinc chromate primer in accordance with SABS Specification 909 prior to despatch from the works.
- (ii) Upon delivery to the site and again after erection any bared or damaged surfaces are to be made good with similar primer.

The Contractor is advised that the finishing coats of paint to be executed after the erection of the structural steelwork have been measured elsewhere.

Class P2 Preparation and Priming Coat: -Where specified, rates for structural steelwork are to include for Class P2 Preparation and Priming Coat as follows: -

- (i) Surfaces shall be thoroughly cleaned by sandblasting to Swedish Standard SIS 055900 standard Sa 2.5 to give minimum peak to valley profile of 50 micrometres when measured by SABS Draft Test Method No.772.
- (ii) Surfaces shall be blown thoroughly clean with compressed air and within four hours of sandblasting, one coat of "Plascon SN 162 Ironguard-4-Zinc" or other approved primer of minimum dry film thickness of 75 micrometres shall be applied by pressure pot spray system in accordance with the manufacturer's instructions in the shop.
- (iii) Upon delivery to the site and again after erection any bared or damaged surfaces are to be made good with similar primer.

The Contractor is advised that the finishing coats comprising one intermediate coat and one finishing coat of chlorinated rubber paint to be executed after the erection of the structural steelwork have been measured elsewhere.

Class P3 Preparation and Priming Coat: -Where specified, rates for structural steelwork are to include for Class P3 Preparation and Priming Coat as follows: -

- (i) Surfaces shall be thoroughly cleaned by sandblasting to Swedish Standard SIS 055900 standard Sa 2.5 to give maximum peak to valley profile of 50 micrometres when measured by SABS Draft Test Method No.772.
- (ii) Surfaces shall be blown thoroughly clean with compressed air and within four hours of sandblasting, one priming coat of "Epidermix 352" or other approved epoxy coal tar of minimum dry film thickness of 75

micrometres shall be applied in the shop.

(iii) Upon delivery to the site and again after erection any bared or damaged surfaces are to be made good with similar primer.

The Contractor is advised that the finishing coat comprising a further coat of epoxy coal tar to be executed after the erection of the structural steelwork has been measured elsewhere.

MEASUREMENT AND PAYMENT:-The provisions of Clause 8 will NOT apply and the system of measurement which is adopted in these Bills of Quantities is the only system of measurement which will be recognised in this Contract.

RATES FOR STRUCTURAL STEELWORK: - Rates for structural steelwork are to include for all necessary cutting to lengths, splay cut ends, shaping, holing, tapping, threading, forging, turning, fitting, assembling, welding and filing smooth, preparation and priming coats as specified, and for hoisting, temporary bracing, and fixing in position.

METALWORK

PROPRIETARY MATERIALS:-Where proprietary materials are specified, the materials used are to be of the type specified or other approved by the Director.

RATES:for all metalwork, unless otherwise stated, are to include for cutting to lengths, shaping, turning, threading, forging, fitting, assembling, riveting, welding, welded running joints, filing smooth, also for all screws and holes and hoisting and fixing in position. All screwed work is to have full threads.

WELDING AND BRAZING: -Where items are described as welded or brazed, rates must include for neatly welding or brazing by experienced workmen using a recognised process and for cleaning and filing or grinding off smooth, all to approval. All welding is to be continuous unless otherwise described.

SCREW FIXINGS:Where items are described as tap screwed, grub screwed, set screwed, etc., rates must include for the necessary screws, for drilling all components and for tapping the components where necessary to receive such screws.

PIPE MEMBERS: - All galvanised mild steel pipe members are to be "medium" pipes complying with BS 1387. Diameters of pipes., unless otherwise stated, are normal internal diameters.

PRIMING OF STEELWORK: - All items of fabricated mild steel except where described to be galvanised, are to be cleaned in accordance with SABS Code of Practice 064 to remove all scale, rust, grease, oil, etc., endeavouring to bring the surface to a bright metallic condition, and painted, unless otherwise specified, with one coat of red oxide zinc chromate primer in accordance with SABS Specification 909 prior to despatch from the works.

GALVANISING OF STEELWORK: - All steel surfaces described to be galvanised are to be thoroughly sand, grit or steel shot blasted to white metal in accordance with SABS Code of Practice 064 and fluxed ready for galvanising, and the completed unit is to be hot dip galvanised after fabrication in accordance with SABS Specification 763 for general applications on the relative thicknesses of metal.

The zinc coating shall be continuous and of even thickness over all surfaces entirely free of bare spots, dull, rough patches, blisters and other imperfections and shall show no signs of peeling. Where site welding has to be done, the welds are to be properly cleaned down and cold galvanised to the approval of the Director. If requested by the Director, the manufacturer shall carry out tests to prove that the requisite mass/thickness of zinc coating is applied and that it is of uniform thickness. The tests shall be made by attaching a test piece of mild steel, approximately 250 x 25 x 6 mm, by means of wire, to an article being galvanised, and subjecting the test piece to the same cleaning, fluxing and galvanising treatment as the article being galvanised, and at completion, the test piece tested by a method approved by the South African Bureau of Standards, the cost of which will be borne by the Contractor.

CHROMIUM PLATING OF STEELWORK: - All items of fabricated mild steel described to be chromium plated are to be properly de-greased, cleaned and polished perfectly smooth before plating and all in accordance with SABS Specification 728. All items are to be first nickel plated then chromium plated to provide a bright mirror finish and all plating is to be equal to sample to be submitted to and approved by the Director.

PRESSED STEEL DOOR FRAMES: - shall be manufactured from mild steel sheet 1,60 mm thick for single rebated frames and 1,20 mm thick for double rebated frames. Rebates shall be suitable for 42 mm thick doors and fanlights.

The sections are to be accurately bent to form the profiles. Corners are to be mitred and welded and reinforced at back with 1,60mm thick steel angle sections. Transoms for fanlights are to be let into the jambs and welded. All welds are to be solid and cleaned off flush, leaving a perfect outside finish.

Each frame is to be fitted with one pair of sturdy angle or channel section tie bars at base, welded below the frame, and where required for additional strength, cross struts of the same section are to be welded between and at right angles to the main tie bars. Each frame is also to be fitted with one diagonal brace as temporary support, standard 230 mm long corrugated adjustable building-in lugs at jambs, three rubber shock absorbers in rebate of lock jambs of frames for single doors and one rubber shock absorber for each leaf in the rebate of the head or transom of frames for double doors.

All frames are to be primed on all surfaces with an approved red oxide zinc chromate priming coat in accordance with SABS Specification 909 before leaving the manufacturer's works, unless specified to be hot dip galvanised, and rates are to include for touching up where necessary with similar primer after building in.

Where frames are specified to be galvanised they are to be hot dip galvanised after manufacture in accordance with the relevant provisions of SABS Specification 763 for general applications on the relative thicknesses of metal. Frames, unless otherwise described, are to be fitted with one and a half pairs of 100 mm five-knuckle loose pin steel hinges, unless otherwise specified for each door or each leaf of double door and with one pair of 75 mm five-knuckle loose pin steel hinges for each fanlight. The three-knuckle leaf of each hinge is to be welded into the frame or transom.

Where frames are described to be fitted with brass butts, the frames are to be checked out and fitted, unless otherwise specified, with one and a half pairs of 100 mm double bronze washered brass butts for each door or leaf of double door, unless otherwise described, and one pair of 75 mm brass butts for each fanlight, with one leaf of each butt secured to the frame or transom by means of 6 mm diameter, countersunk headed brass set screws screwed to and including a 3 mm thick steel backing plate of suitable size welded to frame or transom and drilled and tapped to receive the set screws.

Where frames are described to be fitted with aluminium hinges the frames are to be checked out for and fitted, unless otherwise specified, with one and a half pairs of 100 mm five-knuckle aluminium hinges of 6082 alloy with nylon bushes for each door or leaf of double door, unless otherwise described, and one pair of similar hinges to each fanlight, with the three-knuckle leaf of each hinge secured to the frame or transom by means of 6 mm diameter countersunk headed stainless steel set screws screwed to and including a 3 mm thick steel backing plate of suitable size welded to frame or transom and drilled and tapped to receive the set screws.

Where frames are to be prepared for the top centres of floor spring hinges, a 6 mm thick steel backing plate of suitable size is to be welded into the back of the frame and drilled and tapped to receive the fixing screws of the top centre.

The preparation of frames for all items of ironmongery, other than butts, has been measured separately and the rates against these items are to include for all drilling, morticing, tapping for screws, etc., required for the fixing of keeps, brackets, etc., of the items of ironmongery described. Preparation of frames for locks and latches are to include in addition to the above for recessing and fitting the frames with and including standard keeps and adjustable striking plates to suit the types of locks and latches used and with totally enclosed mortar guards 1,15 m high above finished floor.

Door and fanlight sizes are given to the nearest 10mm. The building in of frames has been measured separately.

PRESSED STEEL CUPBOARD DOOR FRAMES: - shall be manufactured from 1,20 mm thick mild steel sheet standard sections, having rebates for 42 mm thick doors, and fitted with transoms and/or mullions where required and with cill section allowing the cupboard doors to be taken down to general floor level with the floor level inside cupboards not less than 12 mm above general floor level. The frames are to be 102 mm wide overall.

The sections are to be accurately bent to form the profiles. Corners are to be mitred and welded and reinforced at back with 1,60 mm thick steel angle sections. Transoms, mullions and cills are to be neatly fitted at intersections and welded. All welds are to be solid and cleaned off flush, leaving a perfect outside finish.

All frames are to be fitted with rubber shock absorbers to the lock jambs of single doors, and to the head, transom and cill of double doors. Each door is to be fitted with standard corrugated adjustable building in lugs at jambs.

All frames are to be primed on all surfaces with an approved red oxide zinc chromate priming coat in accordance with SABS Specification 909 before leaving the manufacturer's works, unless specified to be hot dip galvanised, and rates are to include for touching up where necessary with similar primer after building in.

Where frames are specified to be galvanised they are to be hot dip galvanised after manufacture in accordance with the relevant provisions of SABS Specification 763 for general applications on the relative thicknesses of metal. Frames are to be fitted with one pair of 100 mm five-knuckle loose pin steel hinges for each lower door or each leaf of lower double door and with one pair of 75 mm five-knuckle loose pin steel hinges for each upper door or each leaf of upper double door. The three-knuckle leaf of each hinge is to be welded into the frame or mullion. Frames for single cupboard doors shall be prepared for locks or catches as specified and the frames for double doors are to be prepared for two barrel bolts for the first closing leaf of lower doors and one barrel bolt for the first closing leaf of upper doors.

Overall sizes are given to the nearest 10 mm. Building in of the frames has been measured separately.

STEEL WINDOWS AND DOORS: - shall be in accordance with SABS Specification 727 and the frames are to be provided with fixing lugs or are to be holed for screwing as required.

Industrial type windows are to be suitable for glazing from the inside and all other windows from the outside, unless otherwise described.

Side hung and vertically pivot hung sashes shall open to at least 90⁰, horizontally pivot hung sashes to at least 80⁰ and bottom hung sashes to 30⁰. Unless otherwise stated, hinges for side hung opening out sashes are to be of the projecting type for easy cleaning. All opening sashes are to have polished brass furniture.

The transoms and mullions of all purpose made windows and doors are to be equally spaced between the outer frames of the windows and doors to form openings of equal size. Where this is not the case either the width or the height of the opening is stated. Unless otherwise stated, the fixed lights and sashes of all purpose made windows and doors are to be in one square and the sashes and doors are to open out.

Windows and doors, unless otherwise specified, shall be of "one piece" construction. Composite windows and doors are to be supplied complete with all necessary standard coupling transoms or mullions.

Stock and purpose made residential type steel windows and school type windows of residential sections shall be constructed of standard 25 mm steel sections and of metal not less than 3 mm thick.

Stock and purpose made. industrial type steel windows shall be constructed with main frames of standard 35 mm steel sections and of metal not less than 3 mm thick and with sashes of standard 25 mm steel sections and of metal not less than 3 mm thick.

"Universal" sections, where specified, shall be not less than 33 mm wide (measured over one opening section only) and of metal not less than 4 mm thick, and with all sight lines maintained (whether consisting of all fixed lights, all opening sashes, or portions of both) and with all glass in the same plane.

Stock and purpose made steel doors, sidelights and fanlights, shall be constructed with the doors of "Universal" sections as before described and the sidelights and fanlights of standard residential sections as before described. Bottom openings in doors and sidelights shall be fitted with kicking plates of one thickness of 1,60 mm mild steel sheet fixed with metal beads. Frames of outward opening doors shall be fitted with bottom cills of door framing section (stepped cills) and of inward opening doors with metal ties welded to frames for embedding in threshold flush cills)

Top Hung Sashes: - are to open out on a pair of steel hinges having brass pins and washers and fitted with brass peg stay, steel peg and locking bracket.

Outward Opening Side Hung Sashes: - are to open out on a pair of steel projection hinges having brass pins and washers and fitted with brass two-point handle and brass striking plate and brass sliding stay with friction fastener.

Inward Opening Side Hung Sashes: - are to open in on a pair of steel hinges having brass pins and washers and fitted with brass single point handle and steel engaging hook and brass sliding stay with friction fastener.

Bottom Hung Sashes: - are to open in on a pair of steel hinges having brass pins and washers and fitted with steel concealed side arms with brass guides and brass spring catch for longarm or hand operation and steel catch plate.

Horizontally Pivot Hung Sashes: - are to have brass adjustable friction ring centres and fitted with brass spring catch for longarm or hand operation and steel catch plate

Projected Out Sashes: - are to be balanced on steel concealed side arms, the top of the sash fitted with spring loaded brass shoes to slide in brass guides and fitted at bottom with brass handle and brass striking plate.

Doors: - are to be hung on one and a half pairs per leaf of steel projection hinges with brass pins and washers and fitted with mortice lockset as specified, and each lock is to be provided with two keys.

Brass concealed bolts are to be fitted at top and bottom of meeting edge of first closing leaf of double doors.

Sidelights and fanlights are to be hung as described for windows.

Adjustable Louvre Sets: - are to be natural anodised aluminium louvre sets of approved manufacture consisting of head and cill weather strips complete with neoprene gaskets and two jamb strips each fitted with louvre brackets with springloaded clips for the specified width of glass louvre blades complete with tilt bars and operating lever handles. Where openings are not of a height to suit standard width louvre blades an alternate head section with static clips must be provided to take a fixed louvre blade of the required width. The louvre sets are to be screwed to the steel window frame with stainless steel self-tapping screws and all portions of the louvre set which come in contact with the window frame are to be insulated with approved pressure sensitive PVC tape to prevent electrolytic corrosion.

Burglar Bars: - are to be standard type burglar bars formed of 20 x 5 mm mild steel bars riveted at intersections and riveted at ends to the window frames. The burglar bars to the small-pane type windows are to line through with the glazing bars, and windows of the horizontal-pane type or of the no-glazing bar type are to be fitted with burglar bars which are divided as for the small-pane type window.

Flyscreens: - are to be standard type flyscreens suitable for residential opening-out type steel windows, unless otherwise described, and are to be constructed of stove enamelled pressed steel frames fitted with 0,25 mm thick mosquito-proof mesh glass-fibre gauze. The flyscreens are to be clipped onto the inner face of the steel window after all painting is completed.

All steel windows and doors are to be primed on all surfaces with an approved red oxide zinc chromate priming coat in accordance with SABS Specification 909 before leaving the manufacturer's works, unless specified to be hot dip galvanised, and rates are to include for touching up where necessary with similar primer after building in. Where steel windows and doors are specified to be galvanised they are to be hot dip galvanised in accordance with the relevant provisions of SABS Specification 763 for general applications on the relative thicknesses of metal.

Loose metal glazing beads, where specified, are to be of an approved type and size, and are to be fixed with screws set in the correct positions for the type of glazing to be used, and neatly mitred at angles.

Immediately the windows and doors have been delivered on site, they are to be thoroughly over hauled and all necessary adjustments or repairs are to be made before they are fixed in position. A further inspection is to be made after building in and any further servicing required must be carried out in order to leave windows and doors in a satisfactory condition after glazing is completed.

All glass and glazing has been measured elsewhere.

Sizes of windows and doors are given to the nearest 10 mm. The building in of windows and doors has been measured separately.

STAINLESS STEEL: - is to be of the thickness and grade specified and unless otherwise stated is to be buffed to an even satin finish to the approval of the Director.

All welding to stainless steel shall be by argon arc process and where filler rods are used these are to have properties not less than those of the parent metal. All welds are to be ground off smooth and uniform and the whole buffed to an even finish all over. Stainless steel is to be cut and bent in such a manner that a minimum of welding is required.

Where bending is required all external angles are to be arris rounded and all internal angles are to be radiussed. All stainless steel work is to be of the highest quality and executed by specialists in this type of work and to the approval of the Director.

ALUMINIUM AND ANODISED ALUMINIUM: - is to be of the brand specified or other approved and of 6063-TF or equivalent quality and temper.

Aluminium bars and sections shall comply with the relevant clauses of BS 1476, extruded tube and hollow sections with the relevant clauses of BS 1474, and sheet and strips with the relevant clauses of BS 1470. All alloys to be anodised are to be of anodising quality.

All aluminium is to be free from flaws, hammer marks, die markings and other imperfections.

Anodising of aluminium is to be carried out in accordance with SABS Specification 999, by an approved process.

The average anodic film thickness shall be 25 micrometres, and at no point should the anodic film thickness fall below 22 micrometres or be thicker than 30 micrometres.

Prior to anodising, all surfaces are to be de-greased and cleaned, all irregularities removed and finished off smooth and buffed where necessary.

All anodised aluminium must be coated with a suitable "non-yellowing" methacrylate lacquer film, approved by the Director, over the entire surface. The lacquer film must be continuous and of a uniform average thickness not less than 10 micrometres. The lacquer thickness must be determined by use of a film meter or other instrument methods as described in ASTM B244-49T. Rates for anodised aluminium must include for this protective coating.

Before the work is put in hand, samples of finish are to be submitted to the Director for approval, and all finished work is to be equal in all respects to the approved samples.

The Contractor shall provide all samples required for testing in accordance with SABS Specification 999. If required, tests on the anodic film are to be carried out at the works of the anodiser to verify that the work conforms with SABS Specification 999, the cost of which will be borne by the Contractor.

The surfaces of all aluminium which are jointed to or are in contact with other materials when fixed, particularly ferrous metals, are to be suitably insulated to prevent electrolytic corrosion.

Joints in all aluminium members are to be neatly formed in an approved manner with screw heads, pins, rivets, etc., concealed so that the joints are practically invisible. Screw or bolt jointing is to be kept to a minimum and will be permitted only when welding is impracticable. Unless otherwise described, stainless steel screws or bolts are to be used for jointing and fixing aluminium work. Welded joints are to be formed by argon arc process using B51476/NS6 welding rods and finished off smooth.

Welding is to be executed in such a manner as not to affect the colour of the material or the anodic coating.

Exposed heads of screws, pins, rivets, etc., in coloured anodised aluminium are to be touched up with enamel paint to match the coloured anodised finish.

No deviation may be made from the general requirements or dimensions, but improvements in the general construction and design affecting neatness, strength or durability may be introduced. If any deviation is proposed, the Contractor must submit detailed drawings showing the particular construction and form or section he proposes to use and such drawings, details and samples of fittings, etc., are to be approved by the Director before manufacture is commenced and every facility must be given for the work to be inspected during manufacture.

No work may be fixed in position until it has been inspected and approved. Anodised aluminium work must be erected as near to the end of the Contract period as possible, to minimise the danger of damage or deterioration.

All work is to be suitably protected during building operations and left in a clean and satisfactory finished condition on completion. In particular, all anodised aluminium work must be protected against damage, and against deterioration or discolouration caused by mortar droppings, wax, paint, etc., all to the entire satisfaction of the Director. All work so damaged, deteriorated or discoloured must be replaced at the Contractor's expense.

Rates for aluminium work are to include for necessary cutting to lengths, shaping, turning, threading, forging, fitting, assembling, riveting, welding, welded running joints, filing smooth, also for all screws and holes and hoisting and fixing in position. All screwed work is to have full threads.

ANODISED ALUMINIUM WELDED WINDOWS AND DOORS: - are to be of an approved manufacture and design.

Windows and doors are to be fabricated from Medium Universal equal leg sections, unless otherwise specified, measuring 33 mm over one opening section and not less than 4 mm thick through the flanges and not less than 4,75 mm through the web, unless otherwise stated.

The aluminium sections are to be of approved manufacture and of 6063-TF or equivalent quality and temper and are to be anodised after manufacture to the approval of the Director.

Welds are to be electrically flash butt resistance welded, properly ground and cleaned off to give a uniform appearance.

Anodising, etc., is to be carried out as before described.

All windows and doors are to be suitable for internal glazing and are to be fitted with approved anodised aluminium glazing beads of the "clip on" type. Drilling for the fixing of glazing beads is to be done to suit the thickness of the

glass used.

The frames are to be perfectly flat, square, butt welded at joints (mechanical joints will not be permitted) and all opening sashes must fit perfectly on all faces and open or close freely without binding at any point. The glazing bars must be continuous with continuous intersections (mitred intersections will not be permitted) with ends scribed and fitted to the frames with shouldered ends passed through and riveted over. The sight lines of the main frame, whether consisting of all fixed lights, all opening sashes or portions of both and the glass plane must be the same throughout each window.

Weathering on sections is to be solid extruded with the sections (screwed or riveted on strips will not be permitted) except weather bars to cills of inward opening sashes which must be welded on and not screwed or riveted except in the approved designs of built-up transoms.

No steel is to be used in the manufacture of the windows unless it is stainless steel of quality to A.I.S.I. Type 316. All fittings, butt hinges, screws, nuts, bolts, etc., are to be of high quality aluminium or other approved non-corrosive material compatible with aluminium and of sufficient strength to perform the functions for which they are used. The handles, sliding stays and peg stays are to have nylon washers, bushes and pressure pads and are to be secured to the frames with screws having riveted ends. Pop rivet fixings will not be permitted.

The transoms and mullions of all purpose made windows and doors are to be equally spaced between the outer frames to form openings of equal size. Where this is not the case either the width or the height of the opening is stated. Unless otherwise stated, the fixed lights and sashes of all purpose made windows and doors are to be in one square and the sashes and doors are to open out.

Frames must be provided with suitable fixing lugs bolted on to frame with aluminium alloy bolts or are to be holed for screwing as required with lugs or holes spaced one near top, one near bottom and not more than 750 mm apart intermediately each side of frame. Frames more than 900 mm wide are to be provided with similar fixings to top and bottom and not more than 750 mm apart.

All composite windows, doors, etc., are to be supplied with suitable and approved coupling mullions or transoms. Rectangular hollow section transoms where specified are to be 25 x 115 mm in section manufactured from 3 mm thick aluminium.

The Contractor must submit drawings showing details of sections he proposes to use and these drawings are to be approved by the Director before manufacture is commenced, and when requested, specimen windows and doors complete with all fittings as well as specimen coupling mullions, transoms etc., must be submitted for approval and all windows, doors, etc., supplied must conform to the approved samples.

The manufacturer of the windows and doors must supply a dimensioned set of drawings with the windows and doors, for use on the site, including clearance and strict fixing methods and details.

Windows and doors are to be delivered to the site in suitable protective wrappings or crates and are to be stacked on end and carefully handled at all times to prevent any marking or staining of surfaces.

Immediately the windows and doors have been delivered on the site, they are to be thoroughly overhauled and all necessary adjustments or repairs are to be made before they are fixed in position. A further inspection is to be made after fixing and any further servicing required must be carried out in order to leave the windows and doors in a satisfactory condition and waterproof after glazing is completed.

Side Hung Sashes: - are to open out on a pair of aluminium hinges complete with anti-friction weatherproof bushings fixed pin and nylon washers and fitted with anodised aluminium alloy sliding stay with friction fastener and an approved anodised aluminium two point handle and striking plate.

Bottom Hung Sashes: - are to open in on a pair of aluminium hinges complete with anti-friction weatherproof bushings, fixed pin and nylon washers and fitted with concealed side arms and strong lever action spring catch and keep.

Top Hung Sashes: - are to open out on a pair of aluminium hinges complete with anti-friction weatherproof bushings, fixed pin and nylon washers and fitted with anodised aluminium peg stay with cranked locking stay.

Horizontally Pivot Hung Sashes: - are to be hung on a pair of approved weatherproof brass satin chrome finished friction pivots of the greatest possible diameter permissible and fitted at top with strong lever action spring catch for longarm or hand operation and striking plate, unless otherwise stated

Vertically Pivot Hung Sashes: - are to be hung on free pivot cups at the head incorporating nylon bearing sleeves and lever pivots at the cill and fitted with one two-point casement handle and striking plate.

Projected Out Sashes: - are to be balanced on approved concealed side arms with stainless steel shoes and channels and fitted at bottom with one approved bow handle with catch incorporated.

Projected In Sashes: - are to be balanced on approved concealed side arms with stainless steel shoes and channels and fitted at top with strong lever action spring catch for longarm or hand operation and striking plate.

Doors: - are to be side hung to open out on one and a half pairs of aluminium hinges to each leaf complete with anti-friction weatherproof bushings, fixed pin and nylon washers and fitted with lockset as specified, and each lock is to be provided with two keys. Satin chrome finish flush bolts are to be fitted at top and bottom of meeting edge of first closing leaf of double doors.

Adjustable Louvre Sets: - are to be approved anodised aluminium adjustable louvre sets consisting of head and

cill weather strips fitted with neoprene gaskets and two jamb strips each fitted with louvre brackets with spring loaded clips for the specified width of glass louvre blades and complete with tilt bars and operating lever handles. Where the openings are not of a height to suit standard width louvre blades an alternate head section with static clips must be provided to take a fixed louvre blade of the required width. The louvre sets are to be tap screwed to the window frame with stainless steel selftapping screws.

Burglar Bars: - are to be standard type burglar bars formed of 20 x 5 mm aluminium bars riveted at intersections and riveted at ends to the window frame with high strength aluminium rivets. The burglar bars to the small pane type window are to line through with the glazing bars, and windows of the horizontal-pane type or of the no-glazing bar type are to be fitted with burglar bars which are divided as for the small pane type window.

All exposed surfaces of anodised aluminium are to be protected by means of an approved fabric backed adhesive tape. The Contractor shall satisfy the Director that the tape he proposes to use can be easily stripped after long exposure to sunlight, and rates are to include for the final stripping of the protective tape and cleaning down to approval at completion.

All work is to be protected during building against deterioration or discolouration caused by mortar droppings, wax, paint, etc., and all work so damaged is to be replaced at the Contractor's expense to the approval of the Director.

All glass and glazing has been elsewhere measured. All sashes and openings, unless otherwise stated, are to be single panes without glazing bars.

All windows and doors must be fixed into preformed openings in the structure (the building-in of windows and doors will not be permitted) and rates are to include for supplying necessary templates for forming the openings. Fixing in position of windows and doors has been measured separately. Sizes of windows and doors are given to the nearest 10 mm.

BURGLAR-RESISTING SAFES: - must comply in all respects with SABS Specification 751. The safes shall be "Office Safe, Category 1" as laid down in SABS Specification 751. Each safe is to be provided internally with one shelf and two lockable drawers.

Where the mass of each safe is 680kg or less, provision must be made for securing it rigidly to prevent unauthorised removal, the means of securing shall be at least equal in effectiveness to that which would be provided by four 12 mm bolts. Locks shall be lever locks with a minimum of six levers. Each safe is to be provided with two keys to each lock and the keys for any safe must be forwarded by the supplier under registered cover direct to the Director, and the supplier must clearly indicate the institution in which the safe (or safes) is being installed.

RIFLE SAFES: - must comply in all respect with SABS Specification 751 Category 1. Each safe is to be provided internally with one removable shelf and racking for twelve "BSA 12/15" or similar target rifles. Each safe is to be fixed in position with and including two steel bolts cut and pinned to brickwork and two steel bolts grouted into and including mortices in concrete floor. Each safe is to be provided with two keys and the keys must be forwarded by the supplier under registered cover direct to the Director, and the supplier must clearly indicate the institution in which the safe (or safes) is being installed.

RECORDS ROOM DOORS: - must comply in all respects with SABS Specification 1015 Category 1. Each door is to be provided with two keys and the keys must be forwarded by the supplier under registered cover direct to the Director, and the supplier. must clearly indicate the institution in which the door (or doors) is being installed.

STRONGROOM DOORS FOR SCHOOL CADET ARMOURIES: - must comply in all respects with SABS Specification 949 Category 2. Each door is to be provided with two keys and the keys must be forwarded by the supplier under registered cover direct to the Director, and the supplier must clearly indicate the institution in which the door (or doors) is being installed.

VITREOUS ENAMELLED CHALKBOARDS: - are to be formed with approved vitreous enamelled steel panels with flanged edges and non-glaring permanent olive green finish complete with fixing lugs and approved vitreous enamelled or extruded aluminium chalk rail.

Rates are to include for hanging the panels to fixing lugs spaced at approximately 450 mm centres and for securing fixing lugs and chalk rails to brickwork with special screws and plastic plugging compound as supplied by the manufacturer of the panels, drilling mortices for wall plugs, rounding off front corners of each end of chalk rail to 25 mm radius, protecting from injury and cleaning down at completion, all in strict accordance with the manufacturer's instructions.

ADJUSTABLE LOUVRE GEAR SETS: - are to be approved natural anodised aluminium adjustable louvre sets consisting of head and cill weather strips fitted with neoprene gaskets and two jamb strips and fitted with louvre brackets with spring loaded clips for the specified width of glass louvre blades and complete with tilt bars and operating lever handles. Where the openings are not of a height to suit standard width louvre blades an alternate head section with static clips must be provided to take a fixed louvre blade of the required width.

Rates are to include for fixing in accordance with the manufacturer's instructions, for screwing head and cill weather strips and jamb strips with stainless steel screws to frames (elsewhere measured) and for oiling and easing at completion.

PLASTERING

MATERIALS

Stone Chippings: - are to be approved clean stone chippings of the sizes stated complying with SABS Specification 1083.

River Sand: -for floor finishes and screeds is to be clean, sharp, coarses and free from all impurities, washed if so directed and complying with SABS Specification 1090.

Plaster Sand: - is to be clean, sharp, free from all impurities, washed if so directed and is to comply with SABS Specification 1090.

Cement: unless otherwise specified is to be Portland cement of normal setting quality, is to comply with SABS Specification 471, and must be used fresh. Cement containing more than 15% blast furnace slag will not be permitted to be used.

Lime: - is to comply with SABS Specification 523.

Water: - is to be clean, fresh and free from injurious amounts of acids, alkalis and other organic substances.

MEASUREMENT OF CONSTITUENT PARTS OF FLOOR FINISHES, TOPPING, SCREEDS AND PLASTER FINISHES: - Cement, sand and stone chippings are to be measured exactly by means of gauge boxes or purpose made wheelbarrows. Pat filling or heaping of normal wheelbarrows will not be permitted.

Water is to be accurately measured for each batch, to approval.

Waterproofing compounds, where specified, are to be added to the mixture in the proportions recommended by and in strict accordance with the manufacturer's instructions.

PREPARATION OF SURFACES: - Prior to the application of floor finishes, toppings, screeds, plaster finishes, etc., the surfaces of the new or existing concrete, brickwork, etc., are to be thoroughly cleaned, chipped, hacked, sloshed, etc., as necessary to ensure a satisfactory bond. The Contractor will be held entirely responsible for the proper and adequate preparation of the surfaces and any work which results in failure in this regard must be made good at the Contractor's expense to the satisfaction of the Director.

FLOOR SCREEDS, ETC.: -Cement screeds are to consist of one part cement and three parts sand, unless otherwise described, and are to be steel trowled, unless otherwise stated, to true smooth and even surfaces, free from tool marks to the satisfaction of the Director to receive the finishes stated in the items.

GRANOLITHIC FINISH TO CONCRETE FLOORS, ETC.: -Float up to within 6mm of finished surface with layers of concrete approximately 10 mm thick, composed of one part cement, two and a half parts concrete sand and three and a half parts granite or other approved hard stone chippings. Form finished surface with one part cement and one part fine granite chippings or other approved hard stone graded up to particles which will pass a 6 mm mesh brought to a smooth surface with a steel trowel. The floating and finishing coats are to be performed in one operation.

The granolithic work is to be carried out by experienced workmen and is to be laid in panels V-jointed and not exceeding 6 m² in area or as shown on drawings or described in the Bills of Quantities.

Thin strips of wood or other suitable materials are to be laid between panels to break contact.

Where granolithic is described to be tinted, the requisite quantity of oxide of iron or other colouring materials is to be mixed with the finishing thickness.

Where granolithic is described to be green tinted, the requisite quantity of green magnesite and cement black is to be mixed with the finishing thickness.

All granolithic floors, etc., are to be covered up and protected from injury and discoloration during the progress of the work.

Rates for granolithic work are to include for cleaning down and for a coat of approved wax polish or stoep reviver well rubbed in at completion.

PLASTER

General

Except where otherwise described, all external plaster is to be finished with a wood float and internal plaster is to be finished with a steel trowel, unless otherwise described, all to true and even surfaces, free from tool marks and other defects to the satisfaction of the Director.

No distinction has been made for brick or concrete surfaces.

Cement plaster

External cement plaster to walls is to consist of one part cement and four parts sand.

External cement plaster to ceilings is to consist of one part cement and three parts sand.

Internal cement plaster to walls is to consist of one part cement and five parts sand.

Internal cement plaster to ceilings is to consist of one part cement and three parts sand.

One coat cement plaster to walls shall not be less than 13 mm or more than 16 mm in thickness, and one coat cement plaster to ceilings shall not be less than 10 mm or more than 13 mm in thickness, unless otherwise described.

Where plaster is described as undecorated, the same type of approved sand and the same brand of cement is to be used throughout to maintain a uniform colour and texture.

Barium plaster

Barium plaster shall consist of two coats plaster, the first coat 13 mm thick consisting of one part cement and five parts sand, and the second coat 6 mm thick consisting of one part cement and five parts Barium Sulphate.

All surfaces are to be plastered in one operation from ceiling to floor and corner to corner; breaks are to be made only in corners or at junctions of walls and ceilings.

CURING, PROTECTION, ETC.:- All floor finishes, pavings, plaster finishes and screeds are to be properly cured to approval and all cracks, blisters and other defects which may occur are to be made good and the whole left in a satisfactory condition at completion.

The finished surfaces are to be properly protected from damage and cleaned down at completion.

RATES: - Rates for floor finishes and screeds are to include for preparation of new or existing surfaces, dressing to falls where required, V-joints where specified, curing, protecting from damage and cleaning down at completion.

Rates for skirtings, risers, etc., are to include for internal angles at junction with floor, treads, etc., to be square or coved to not more than 50 mm girth and in addition are to include for mitres, stops, etc., except where given separately in terms of the Standard System of Measuring Builders' Work.

Rates for plaster finishes are to include for preparation of new or existing surfaces, curing, protecting from damage and cleaning down at completion.

Rates for plastering are to include for internal angles to be square or coved to not exceeding 50 mm girth.

Rates for rounded angles, fair edges and arisses and the like are to include for mitres, stops, etc., except where given separately in terms of the Standard System of Measuring Builders' Work.

Rates for mouldings, projecting bands, coves, weatherings and the like are to include for dubbing out.

Rates are to include for cutting back against frames and for V-joints cut where concrete abuts brickwork.

Rates generally are to include for all sundry making good and working around pipes, balusters, etc.

GENERALLY

Narrow widths

Items described as "Extra over for narrow widths" include for all reveals, edges, soffits, treads, risers, etc., not exceeding 500 mm wide, narrow widths not exceeding 500 mm wide in general surfaces caused by openings or projections, all of which have been included in the areas of horizontal or vertical surfaces. No distinction has been made for finishes of differing thicknesses.

TILING

MATERIALS

River Sand: - is to be clean, sharp, coarse sand, free from all impurities, washed if so directed and complying with SABS Specification 1090.

Plaster Sand: - for wall backings is to be clean, sharp, free from impurities, washed if so directed and complying with SABS Specification 1090.

Cement: unless otherwise specified, is to be Portland cement of normal setting quality complying with SABS Specification 471 and must be used fresh. Cement containing more than 15 % blast furnace slag will not be permitted to be used.

Water: - is to be clean, fresh and free from injurious amounts of acids, alkalis and other organic substances.

MEASUREMENT OF CONSTITUENT PARTS OF BACKINGS, ETC.: - Cement and sand are to be measured exactly by means of gauge boxes or purpose made wheelbarrows. Part filling or heaping of normal wheelbarrows will not be permitted.

Water is to be accurately measured for each batch to approval.

Waterproofing compounds, where specified, are to be added to the mixture in the quantities recommended by and in strict accordance with the manufacturer's instructions.

PREPARATION OF SURFACES: Prior to the application of the backing for tiles, the surfaces of the new or existing concrete, brickwork, etc., are to be thoroughly cleaned, chipped, hacked, sloshed, etc., as necessary to ensure a satisfactory bond. The Contractor will be held entirely responsible for the proper and adequate preparation of the surfaces and any work which results in failure in this regard must be made good at the Contractor's expense to the satisfaction of the Director.

GLAZED CERAMIC WALL TILES AND FITTINGS: - shall comply with SABS Specification 22 of selected grade, free from defects and blemishes and of uniform colour.

Rates are to include for either bedding tiles on and including a solid cement mortar backing consisting of one part cement to three parts sand on brickwork or concrete, or fixed with an approved tile adhesive on and including a coat of cement plaster consisting of one part cement to five parts sand and finished to a surface to receive tiles.

Tiles are to have vertical and horizontal joints continuous with all joints solidly flushed up in neat white cement.

MOSAICS: - Glass or ceramic mosaics are to be of approved South African manufacture of the sizes and colours specified, fixed to paper panels for ease of handling.

Mosaics are to be bedded to a true even surface on and including a solid cement mortar backing consisting of one part cement and three parts sand on brickwork or concrete, or fixed with an approved mosaic adhesive on and including a coat of cement plaster consisting of one part cement to three parts sand finished to a surface to receive mosaics.

After setting, the paper panels are to be removed and all joints are to be solidly flushed up in neat white cement. Samples of mosaics are to be submitted to the Director for approval before any work is put in hand.

UNGLAZED CERAMIC FLOOR TILES AND FITTINGS: - are to be unglazed acid and alkali resistant tiles and fittings of the types specified in the items, and of approved manufacture, uniform in size, shape and colour, free from cracks, twists and other defects and equal to samples to be deposited with and approved by the Director. Floor tiles are to be laid with maximum 10 mm wide joints continuous in both directions on and including a 15 mm thick cement mortar bed consisting of one part cement to three parts sand, unless otherwise specified, to true levels and grades with the joints raked out and grouted up solid and flush pointed with an approved epoxy Jointing compound.

Floor tiles are to be set out so as to have no long edges of tiles cut to suit room size.

RATES: for tiles, mosaics, etc., are to include for all necessary preparation of surfaces, for laying in accordance with the manufacturer's instructions, all square cutting and waste and fitting, protecting from damage and cleaning down at completion.

Rates for tiles are also to include for laying, bedding, jointing and pointing as described and in accordance with SABS Code of Practice 0107 where applicable.

Rates for treads, risers, cills, copings, cappings, skirtings, etc., are to include for pointing to exposed edges and projecting soffits.

No distinction has been made for brick or concrete surfaces.

DRAINAGE AND PLUMBING

GENERALLY:-The Standard Preambles for other trades, with reference to Excavations, Concrete, Brickwork and Plastering, and, in particular for the full description, intent and meaning of the classification for excavations, are to apply equally to this trade.

LICENSED DRAINLAYERS AND PLUMBERS: - Only licensed drainlayers shall be employed on any drainage work and licensed plumbers on plumbing work.

SUBSOIL DRAINS

Unplasticised polyvinyl chloride (UPVC) slotted drainage pipes and fittings shall be of approved manufacture jointed in accordance with the manufacturer's instructions.

Pitch-fibre perforated or slotted drainage pipes and fittings shall comply with SABS Specification 921 and shall be jointed in accordance with the manufacturer's instructions.

Filter fabric shall be non-woven, spunbonded, needle punched, continuous polyester fabric, resistant to the effects of alkalis, acids, saline solution and sunlight.

STORMWATER AND SOIL DRAIN PIPES

Reinforced concrete non-pressure pipes shall comply with SABS Specification 677 and must be Type SC of the class specified with spigoted and socketed ends with rubber insertion ring or with ogee joints with approved rubber collars. Pipes must be marked with the manufacturer's name, trade name or registered trade mark, nominal bore, class and type, date of manufacture, the letter "R" denoting reinforced and the SABS mark. Joints shall be made in accordance with SABS Code of Practice 058.

Unplasticised polyvinyl chloride (UPVC) drain and sewer pipes and fittings shall comply with SABS Specification 791. Joints shall be made with fittings in accordance with SABS Code of Practice 058.

Cast iron pipes and fittings shall comply with SABS Specification 746. Pipes must be Type B with spigoted and socketed joints and each pipe or fitting must be badged with the manufacturer's name or trade name and must be coated internally and externally with an approved bituminous preservative solution. Joints shall be made with tarred hemp and lead caulked into joint until socket is filled.

Heavy duty cast iron pipes and fittings shall comply with BS 78 and must be as before described for cast iron pipes and fittings.

Vitrified clay pipes and fittings shall comply with SABS Specification 559. Socketed pipes shall be fitted and jointed together in accordance with SABS Code of Practice 058 or with factory applied mechanical compression joints comprising socket liner and spigot collar or spigot seal ring of suitable resilient material to form a permanent watertight seal. Pipes with plain ends must be jointed with approved polypropylene couplings in accordance with the manufacturer's instructions.

Asbestos cement sewer pipes shall comply with SABS Specification 819 and must be of the class specified. Pipes must be marked with the manufacturer's name, trade name or registered trade mark, the date of manufacture, the nominal bore, class and the SABS mark. Fittings must be from the same manufacturer as the pipes.

CONCRETE BEDS AND ENCASEMENT TO DRAIN PIPES:-Where pipes are required to be bedded on concrete, the bed of concrete Class B shall be a minimum of 500 mm wider than the diameter of the pipe, laid to correct falls and levels with recesses formed in same for pipe joints including all necessary formwork and any additional excavation. The barrel of the pipe shall then be bedded on a thin cement mortar (1:3) bed and laid to falls. After jointing, the recesses previously formed shall be filled in with concrete Class B and the haunching or surrounding completed.

Where pipes are fixed vertically they shall be encased in concrete Class B having a minimum thickness of 150 mm around the pipe and carried up to ground level and shall include for any necessary formwork.

PIPE LAYING: - All drain and sewer pipes are to be laid to a straight line to even gradients and jointed in accordance with SABS Code of Practice 058 except in the case of polyethylene or unplasticised polyvinyl chloride drain and sewer piping which is to be in accordance with SABS Code of Practice 0112.

Before laying, each pipe shall be examined to ensure that the bore is clean and free of any foreign matter and shall be tested for soundness by striking with a wooden mallet, and any cracked or damaged pipes shall be rejected. Ends of all pipes must be clean before jointing. Immediately after jointing a tight fitting wad or scraper shall be

drawn several times through the bore of the pipe to ensure that it is left clean and free from obstructions. Whenever work is suspended, the open ends of pipes and junctions must be temporarily plugged to prevent the entrance of rubbish during construction.

GULLEY TRAPS: - Gulley trap assemblies must be of the material specified with "P" or "S" trap, jointed to drain and with hopper head with vertical and side inlets, the head fitted with 190 mm diameter cast iron gulley grating complying with SABS Specification 1115 laid loose in socket. The trap, hopper head and vertical pipe shall be set on and encased in concrete Class B having a minimum thickness of 150 mm at any one part, carried up 75 mm above ground level as kerb, dished down to grating and finished on all exposed surfaces in 1:3 cement plaster with angles rounded, including necessary excavation and formwork.

GREASE TRAPS: - Grease trap assemblies of verified clay must consist of outlet junction jointed to trap with side inlet. Access openings of trap and junction shall be fitted with vitrified clay stoppers laid loose in socket of trap and set in bitumen in socket of junction. The trap and junction and vertical pipe shall be set on and encased in concrete Class B having a minimum thickness of 150 mm at any one part, carried up 75 mm above ground level as kerb, dished down to grating and finished on all exposed surfaces in 1:3 cement plaster with angles rounded, including necessary excavation and formwork.

RODDING EYES: Where pipes are carried up in ramps for rodding eyes, the head of the pipe at ground level must be fitted with an "A.B.C." cast iron cover and frame, complying with SABS Specification 746, jointed to pipe, the frame rebated for and including cover with raised letters "CE" cast on same, secured to frame with gun-metal screws and with the whole encased in concrete Class B having a minimum thickness of 150 mm at any one part, carried up 75 mm above ground level and finished on all exposed surfaces in 1:3 cement plaster with angles rounded, including necessary excavation and formwork.

INSPECTION EYE BLOCKS: - Where inspection eye fittings are provided in pipelines, the position of these inspection eyes must be registered and demarcated with concrete Class C block size 300 x 300 x 50 mm thick finished on all exposed surfaces with 1:3 cement plaster with angles rounded and with sunk letters "I.E." formed in top and set in ground, including necessary excavation and formwork.

SURFACE WATER CHANNELS: - Concrete open surface water channels shall be formed with concrete Class B with segmental channel formed in same to the size and shape specified and finished on exposed surfaces in 1:3 cement plaster, steel trowelled to a smooth even surface with all angles rounded, cast in lengths not exceeding 2 m and laid to falls, including necessary excavation and formwork.

CAST IRON GRATINGS FOR GULLEYS AND STORMWATER DRAINS AND CAST IRON SURFACE BOXES AND MANHOLE COVERS AND FRAMES: - Cast iron gratings for gulleys and stormwater drains shall comply with SABS Specification 1115.

Cast iron surface boxes and manhole covers and frames shall comply with SABS Specification 558. All cast iron gratings, cast iron surface boxes and cast iron manhole covers and frames must be coated with approved preservative solution before leaving the manufacturer's works. The masses stated are the combined mass of the grating and frame or the combined mass of the cover and frame.

STORMWATER SUMPS, JUNCTION BOXES, MANHOLES, INSPECTION CHAMBERS, CABLE INSPECTION CHAMBERS AND VALVE CHAMBERS: - shall be of the internal size specified and are to be constructed of one brick sides, unless otherwise specified, built in 1:3 cement mortar on a 150 mm thick concrete Class C bottom and finished on top with an 85 mm thick precast concrete Class C cover slab, reinforced as detailed and bedded in cement mortar. The cover slab, except to junction boxes, is to have a rebated opening formed in same, suitable for and fitted with a cast iron grating and frame, or cover and frame, of the size and mass specified with the frame bedded in cement mortar. The bottom of the sump, manhole, etc., and the exposed surfaces of the cover slab are to be finished smooth in 1:3 cement plaster with angles rounded. The internal brick surfaces are to be faced with smooth facing bricks and pointed with flush joints.

Inspection chambers and manholes with an invert not exceeding 1 m shall have an internal dimension of 470 x 700 mm and those exceeding 1 m shall have an internal dimension of 920 x 920 mm. Where the invert of the manhole exceeds 1 m, a 150 mm thick reinforced concrete Class C corbel slab, reinforced as detailed, with opening size 470 x 700 mm formed in same and finished smooth off the formwork, is to be built into the brick sides at a height not exceeding 1,5 m above the concrete bottom with the reduced manhole shaft built off the top of the corbel slab. Cast iron step irons spaced at 300 mm staggered centres vertically are to be built into one side of all manholes with an invert exceeding 1m.

Where measured in number, rates for all sumps, manholes, etc., are to include for excavating to the depths required, taking precautions against collapse of sides of excavations, staging, ramming, pumping and baling to keep excavations free from water or mud, filling around and ramming and depositing and levelling spoil on site or carted away as directed. Ends of pipes are to be built through the sides of the sumps, manholes, etc., and rates are to include for this.

SOIL DRAIN MANHOLES AND INSPECTION CHAMBERS: - are to be of the internal diameter and inverts specified and are to be constructed of precast reinforced concrete manhole ring sections with walls a minimum of 50 mm thick, precast reinforced concrete cover slabs and spacer pieces complying with SABS Specification 677.

The joints for the ring sections shall be of the ogee type. The bottom shall be of concrete Class C cast in-situ. The placing of the concrete bottom and benching shall be carried out in three stages with the initial stage being the laying of the concrete bottom projecting 100 mm beyond the external diameter of the manhole on which is laid the inspection eye pipe, branches, etc. The second stage comprises the laying of concrete within the manhole to the height of the pipes and around the perimeter of the bottom to a height of not less than 25 mm above the collar of the pipe at the highest end. This annular base is to be shuttered to provide a horizontal setting for the first ring section which is to be firmly bedded in the wet concrete. The third stage comprises the laying of the benching within the initial ring section and finished in 1:3 cement plaster with all angles rounded. Thereafter, the ring sections of the required standard height are joined together to form the required depth, with all joints primed with "Bituprime" and sealed with "Bitujoint Putty". A 125 mm thick precast reinforced concrete cover slab, rebated on underside to suit ring sections and with opening size 600 x 600 mm formed in same is to be bedded on top of the ring section. The shaft above the cover slab is to be constructed of either precast reinforced concrete spacer units to suit the type of cast iron cover and frame specified, or one brick kerb walls faced internally with smooth facing bricks, pointed with flush joints, and finished on top with an 85 mm thick precast concrete Class C cover slab, reinforced as detailed and bedded in cement mortar with the exposed surfaces finished smooth in 1:3 cement plaster with all angles rounded. The cover slab is to have a rebated opening formed in same suitable for and fitted with cast iron cover and frame of the size and mass specified, with the frame bedded in cement mortar.

SOAK PITS: - shall be of the lengths and widths specified and shall be a minimum of 900 mm deep below the invert of the inlet pipe. A perforated pitch-fibre drain pipe jointed to the inlet pipe and with other end capped is to be laid level in a 19 mm stone packing of a minimum thickness of 150 mm below and at sides of pipe and a minimum thickness of 50 mm above the top of the pipe. The remainder of the soak pit is to be filled with stone graded from 50 mm to 75 mm to a level of 50 mm above the top of the pipe. The stone is to be covered with corrugated asbestos cement sheets extending 150 mm beyond the walls of the soak pit all round. The trench shall be backfilled above the sheeting to a minimum depth of 300 mm lightly rammed with the final 100 mm of backfilling being approved top soil from the excavations.

SEPTIC TANKS: - shall be of the internal sizes specified and are to be constructed of one brick sides built in 1:3 cement mortar on 150mm thick concrete Class C bottom laid to falls A half brick baffle wall finished 75 mm below underside of concrete cover slab and with opening size 150 X 150mm high formed in wall, is to be built in 1:3 cement mortar on the concrete bottom. A 115 mm thick reinforced concrete Class C cover slab, reinforced as detailed, is to be cast in-situ on removable formwork and is to have two openings formed in same, each suitable either for and fitted with 600 x 450 mm x 38 kg cast iron single seal manhole cover and frame, or for the shaft of the inspection chamber built off the cover slab in one brick walls in 1:3 cement mortar with smooth face bricks internally, finished on top with 85 mm thick precast concrete Class C cover slab, reinforced as detailed and rebated for and fitted with 600 x 450 mm x 38 kg cast iron single seal manhole cover and frame. The bottom and sides of the septic tank are to be finished in 1:3 cement plaster, 19mm thick, with an approved waterproofing compound added, with all internal angles coved to 50 mm radius. Inlet and outlet chambers attached at either end of the septic tank shall be size 600 x 450 mm internally, of the depth required and each shall be constructed of one brick walls built in 1:3 cement mortar on a concrete Class C bottom 150 mm thick, or where extended above the top of the septic tank cover, built off the cover and finished on top with 85 mm thick precast concrete Class C cover slab, reinforced as detailed and bedded in cement mortar with the exposed surfaces finished smooth in 1:3 cement plaster with angles rounded. The cover slab is to have a rebated opening formed in same suitable for and fitted with a 600 x 450 mm x 38 kg cast iron single seal manhole cover and frame. Chambers shall be provided with inspection eye pipes or bends, straight or curved channel sections, benched up to sides of chambers in concrete Class C, finished in 1:3 cement plaster with all angles rounded.

The inlet and outlet of the septic tank shall be formed of cast iron square junction piece with tail-pipe extending 300 mm below water level in tank, built in through end walls and jointed to channels in inlet and outlet chambers.

TESTING OF DRAINS, MANHOLES AND INSPECTION CHAMBERS: - All drains, manholes and inspection chambers with the exception of subsoil drains shall be constructed so as to be watertight. No trenches shall be backfilled or pipes encased in concrete until the drains have been tested and approved. Any drains covered by the Contractor prior to testing shall be exposed at the Contractor's expense.

The Contractor shall give at least 24 hours notice of any particular length between manholes ready for testing. The drains shall not be tested until a period of 24 hours, or such other period as may be required, has been allowed for the pipe joints to set. The Contractor shall provide all necessary testing apparatus, expanding plugs, stoppers, water and any other materials and all labour that may be required for carrying out the tests.

The whole of the drainage system shall be tested using one or more of the following tests: -

(a) **Visual test** - Each length of pipe shall be inspected for invert level grade, direction and line. Internal inspection of the bore of the pipes shall be made using mirrors and a powerful source of light. The drains must be free of invert lips and the base of the pipes must be straight.

(b) **Air test**-All openings in the drain shall be plugged and sealed and all associated traps filled with water and air pumped into the drains until a manometric pressure of 40 mm is indicated, after which, without further pumping, the pressure shall not drop below 25 mm for a period of at least 30 seconds.

After the entire drainage system has been completed, all plumbing fittings installed and permanently connected up, and traps filled with water, a final air test shall be applied to the whole system.

(c) **Water test**-All openings in the drain, except the highest one, shall be plugged and sealed and the drain filled with water so that every part of the system is tested under a head of water of not less than 1,5 m and

not more than 3,5 m. After allowing a period of 10 minutes for initial absorption, the amount of water it shall be necessary to add to maintain the water level over the next 15 minutes shall not exceed a rate of 2,5 litres for 100 mm diameter pipe and 3,75 litres for 150 mm diameter pipe for 100 m of drain and an equivalent rate for larger drains. In carrying out the water test, the head of water shall be obtained by providing temporary pipes, fittings, etc., wherever necessary or by such other method as may be approved. In cases where the maximum head of water, owing to the gradient of the drains, would be exceeded in any section; inspection eyes at suitable intervals may be provided and the drain plugged, in order not to subject the lower portion of the drain to a greater head of water than that required. Drains must be free of air before testing.

(d) Manhole and Inspection Chamber test- The inlet and outlet pipe lines shall be plugged and sealed and the inspection chamber filled with water. After allowing the water to stabilise due to absorption the water level should not fall more than 5 mm in 2 hours.

DEFECTS TO BE MADE GOOD: - Should the drain system fail to withstand the above tests all defects shall be made good and the tests repeated at the Contractor's expense until the whole system is sound, to the satisfaction of the Director. In making good, all defective parts shall be cut out and replaced with new. No patching of pipes, joints or connections will be permitted.

SHEET METALWORK: -generally is to be lapped 75 mm at ends and 150 mm at angles, unless otherwise specified. Rates for sheet metalwork shall include for all labour, cutting and waste, laps, seams, welts, angles, clips, tacks, soldered dots, riveting, soldering, brazing, burning, nailing, dressing and wedging as required. All measurements are net with no allowance being made for laps, seams, welts, angles, clips and tacks or waste in cutting. Where stepped flashings are described as to flat slope, the pitch of the roof to which they apply does not exceed 40°.

(a) Galvanised sheet iron shall be of an approved brand of the thickness specified after galvanising and having a galvanised coating of "Iscor Coating Designation 24 50". Corroded or otherwise defective sheets shall not be used. All nailing or screwing shall be done with galvanised nails or screws.

(b) Sheet aluminium shall be of the thickness and quality specified. All nailing shall be done with aluminium alloy nails and all screwing done with stainless steel screws.

(c) Sheet copper shall be cold rolled sheet of the thickness and temper specified. Sheet copper for covering flat roofs and for valley and gutter linings, flashings, soakers, etc., shall be of dead-soft temper and for eaves gutters, rainwater pipes and other unsupported or semi self-supported work shall be of halfhard temper. All nailing shall be done with copper or copper alloy nails and all screwing done with brass screws.

(d) Sheet lead shall be best milled sheet lead of the full mass specified and of equal thickness throughout and must comply with BS Specification 1178.

LININGS TO VALLEYS:- shall be of the material specified, lapped 200 mm at ends and dressed up on to purlins or battens at sides of valleys with edges bent back to form open beads.

LININGS TO SECRET GUTTERS:- at back of chimney stacks and wall abutments and at raking intersections of walls and roofs shall be of the material specified, turned 100 mm up vertical surfaces and dressed 250 mm up roof slope and on to purlin or batten at edge.

SOAKERS: - to slate covered roofs shall be of galvanised sheet iron or sheet copper of 0,6 mm thickness, 450 mm wide to closed valleys and 250 mm wide to raking intersections of roofs with vertical wall and chimney stack abutments and turned 75 mm up vertical surfaces. Soakers shall be 75 mmlonger than the gauge of the slate roofing.

UNDER-FLASHINGS: - to all iron roofs and where specified to slate or tiled roofs shall be 0,6 mm thickness galvanised sheet iron. Flashings to asbestos cement roofs shall be asbestos cement preformed units fitted in accordance with the manufacturer's instructions. Where specified, copper flashings shall be formed from sheet of 0,6 mm thickness and aluminium flashings shall be formed from 1200-H4 quality sheet of 0,6 mm thickness. Lead flashings, where specified, shall be formed from sheet having a mass of 24 kg/m².

COVER FLASHINGS: -shall be either galvanised sheet iron, copper or aluminium, as specified, of 0,6 mm thickness fitted over under-flashing, stepped where required on rake and with top edge bent and wedged 25 mm deep into joint of brickwork or groove formed in concrete face and flush pointed in 1:3 cement mortar.

FLASHINGS AROUND PIPES THROUGH ROOF COVERINGS

(a) Pipes through preformed sheet steel roofing shall be flashed around with 0,6 mm galvanised sheet iron apron pop-riveted to top of roofing with edges cut and dressed to profile of roofing, soldered all round and with conical sheet iron up stand, riveted and soldered at joint and at base to apron. The top of the conical upstaged is to be fixed around the pipe with 25 x 3 mm galvanised mild steel strap wrapped around the pipe and fixed with a galvanised steel gutter bolt.

(b) Pipes through asbestos cement roofing shall be flashed around with 24 kg/m² lead apron dressed into corrugations, bedded in mastic and bolted to roof sheeting with galvanised steel gutter bolts and with conical lead upstand, wiped on at joint with apron, and secured around pipe with copper wire.

(c) Pipes through slate or tile roofing shall be flashed around with 24 kg/m² lead apron dressed to profile of slates or tiles with top edge of lead apron dressed over back edge of slate or tile under overlap of slates or tiles. A conical lead upstand, wiped on at joint with apron, is to be secured around the pipe with copper wire.

(d) Pipes through pre-painted or embossed sheet steel or aluminium roofing shall be flashed around with flexible glass-fibre reinforced waterproofing dressed to profile of roofing, pop-riveted around edges to roofing and dressed up and around pipe. The waterproofing is to be finished in a colour to match that of the roofing material.

RAINWATER PIPES

(a) **Galvanised sheet iron rainwater pipes**, offsets and shoes shall be formed from 0,6 mm thickness sheet, seamed at back and jointed with soldered slip joints. Pipes must be fixed 25 mm clear of finished wall face on brackets at not exceeding 2 m centres formed of 1,6 mm x 25 mm galvanised mild steel wrapped around pipe and bolted to 3 mm x 25 mm galvanised mild steel U-shaped brackets holed for and screwed to plugs in wall. Rainwater pipes fixed in recesses must have galvanised sheet iron ears soldered on across the pipe and screwed to plugs in wall.

(b) **Copper rainwater pipes**, offsets and shoes shall be as described in (a) above but formed from 0,6 mm thickness cold rolled sheet copper of half hard temper and fixed on brackets formed of hard copper strip as described above.

(c) **Asbestos cement rainwater pipes**, offsets and shoes shall be of approved manufacture with spigot and socketed ends, jointed with tarred hemp rope gasket caulked into each joint and the joint filled with approved bitumen compound and finished off with a neat trowelled fillet of 1:3 cement mortar. The pipes must be fixed clear of the finished wall face on approved aluminium alloy brackets with tails driven in or cut and pinned in 1:3 cement mortar.

(d) **Unplasticised polyvinyl chloride (UPVC) rainwater pipes** and accessories, shall comply with SABS Specification 967 and must be fixed clear of the finished wall face on stock pattern brackets in accordance with the manufacturer's instructions.

(e) **Galvanised mild steel rainwater pipes**, shall be medium quality screwed and socketed normalised welded mild steel pipes, galvanised inside and outside, and shall comply with SABS Specification 62. Fittings for galvanised mild steel pipes shall comply with SABS Specification 509. The screwed joints must be made with lead paint and hemp or approved thread sealing tape. The pipes must be fixed clear of the finished wall face with galvanised cast iron hinged holderbats built into walls at not exceeding 2 m centres in 1:3 cement mortar.

(f) **Cast iron rainwater pipes**, shall comply with SABS Specification 746 and shall be spun-cast with spigot and socketed ends jointed with gaskin and lead or approved jointing compound caulked in until the socket is completely filled. The pipes must be fixed clear of the finished wall face with cast iron hinged holderbats built into walls at not exceeding 2 m centres in 1:3 cement mortar.

EAVES GUTTERS

(a) **Galvanised sheet iron gutters, rainwater heads, etc.**, shall be formed from 0,6 mm sheet and must have beaded edges with all laps riveted and soldered. Corners must be reinforced with 0,6 mm x 50 mm wide galvanised sheet iron strips and must be soldered across the inside of the angles.

Gutters must be laid to even falls on approved galvanised mild steel gutter brackets screwed to roof timbers at approximately 1 m centres. Half round pattern gutters shall be bolted to each bracket with 6 mm galvanised gutter bolt fitted close to the beaded edge. Rectangular pattern gutters shall be fixed at each bracket with galvanised mild steel long-screw with 1 mm thick galvanised sheet iron spacer tube.

(b) **Asbestos cement gutters and accessories** shall be of approved manufacture, not less than 6 mm thick, with spigot and socketed joints made in an approved mastic compound in accordance with the manufacturer's instructions. Gutters must be laid to even falls on approved aluminium alloy or stock asbestos cement brackets screwed to roof timbers at the manufacturer's recommended spacings.

(c) **Sheet copper gutters** shall be formed from 0,6 mm sheet copper of half-hard temper unless otherwise specified, and must have beaded edges with all laps riveted and soldered. Gutters must be laid to falls on 5 x 40 mm hard copper brackets screwed to roof timbers at approximately 1 m centres.

(d) **Unplasticised polyvinyl chloride (UPVC) gutters and accessories** shall comply with SABS Specification 11 and must be laid to falls and fixed on brackets in accordance with the manufacturer's instructions

SANITARY PLUMBING AND FITTINGS

WASTE, VENTILATION AND ANTI-SYPHON PIPES

(a) **Galvanised mild steel pipes** shall be medium quality screwed and socketed normalised welded mild steel pipes, galvanised inside and outside, and shall comply with SABS Specification 62. Fittings shall be brass or galvanised malleable cast iron complying with SABS Specification 509 and where accessible, shall have inspection eyes with spanner headed brass caps with washers, threaded and screwed into position. Screwed joints shall be made with red lead paint and hemp or thread sealing tape, with the cut ends of pipes reamed out to remove burrs. Pipes shall be fixed clear of walls with galvanised malleable iron brackets for pipes up to and including in 80 mm diameter and with galvanised cast iron hinged holderbats fastened with brass pins or bolts for pipes exceeding 80 mm diameter, all built into walls at not exceeding 2 m centres in 1:3 cement mortar. Pipes slung to slab soffits shall be fixed to falls on approved metal hangers at not exceeding 1,2 m centres. Pipes shall be fixed to timber work with approved galvanised mild steel pipe clips screwed on.

(b) **Cast iron pipes and fittings** shall be of approved manufacture, badged with the manufacturer's name and trade name and coated inside and outside with an approved bituminous preservative solution and shall

be either spun cast spigot and socket pipes complying with SABS Specification 746 or spun cast plain ended pipes. Spigot and socket pipes shall be jointed with gaskin and lead or approved jointing compound caulked in until the socket is completely filled. Plain ended pipes shall be jointed with approved stainless steel pipe coupling with neoprene rubber gasket or with approved cast iron coupling with neoprene rubber gasket bolted on. The pipes must be fixed clear of the finished wall face with cast iron hinged holderbats built into walls at not exceeding 2 m centres in 1:3 cement mortar.

(c) Unplasticised polyvinyl chloride (UPVC) pipes and fittings shall be of approved manufacture marked with the manufacturer's name and trade name, the nominal bore and the South African Bureau of Standards mark and shall comply with SABS Specification 967. Joints shall be made with injection moulded fittings in accordance with the manufacturer's instructions and SABS Code of Practice 0112. The pipes must be fixed clear of the finished wall face with aluminium alloy holderbats fitted with plastic cushion strips with the holderbats fixed to plugs in wall.

(d) Polypropylene pipes and fittings shall be of approved manufacture and shall have a mechanical form of jointing. Pipes and fittings are to be fixed and jointed in accordance with the manufacturer's instructions.

SANITARY FITTINGS: - All glazed ceramic sanitaryware shall comply with SABS Specification 497.

Wash hand basins shall be of white glazed fireclay or vitreous china of the type and size specified. Basins shall have an integral overflow and be fitted with 32 mm chromium plated waste union with flange and grating, rubber plug on chromium plated brass chain and, where necessary, tap hole stopper cemented in.

W.C. pans shall be of white glazed fireclay or vitreous china of the type specified with "S" or "P" trap with straight or side outlet and shall be fitted with single or double flap plastic seat as required, secured to pan with concealed brass holding down bolts. Pans shall be bedded on the concrete floors in 1:3 cement mortar.

Glazed ceramic urinals of the bowl or stall type shall be of white glazed fireclay or vitreous china. Bowl urinals shall be fitted with 40 mm chromium plated waste union, with flange and domical grating and with spreader with flush pipe connector. Stall urinals shall be fitted with 75 mm chromium plated waste union with flange and hinged domed grating and with spreader with flush pipe connector.

Flushing cisterns shall be as specified, either of white porcelain enamelled cast iron, white glazed fireclay, vitreous china or black plastic complying with SABS Specification 821, each with body and cover. Cisterns shall be of 11 litre capacity and the flushing apparatus shall be of brass, copper or other corrosion resistant metal, PVC or other approved plastic or of an approved ceramic material. Connections for flush pipe, inlet and overflow pipe must be provided in the body. Cisterns shall be fitted with 15 mm brass ball valve with copper, PVC or polystyrene ball and with either chromium plated operating lever handle or galvanised steel pull chain and handle. A galvanised, white enamelled or chromium plated steel or copper flush pipe, of the required length, as specified, is to be jointed to the flush pipe connection on the body of the cistern and in the case of W.C. pans is to be fixed to the inlet of the pan with an approved patent adaptor. From the overflow connection on each cistern a 22 mm copper overflow pipe, bent as required, shall be taken through wall to discharge externally, with end splay cut and projecting 50 mm beyond wall face, or where this is not possible, bent to discharge into W.C. pan.

Baths shall be enamelled cast iron baths of the type and size specified, holed for and fitted with chromium plated brass overflow union with grating, 40 mm chromium plated brass waste union with flange and grating, rubber plug on chromium plated brass chain and fitted with adjustable cast iron feet. The fall along bottom of baths from head ends to outlets must be adequate for complete emptying.

Stainless steel sinks and drainers shall be of the types and sizes specified with exposed surfaces buffed to a satin finish and sound deadened on underside by application of an approved sound deadening coating. Splashbacks with tiling keys shall be provided at back and at ends against walls or as specified. Sink bowls are to be pressed out of single sheets with complete drainage to outlets and each bowl is to be fitted with integral built in overflow with chromium plated brass grating and 40 mm recessed waste outlets with chromium plated brass waste union with grating, rubber plug and chromium plated brass chain. Sink bowls, unless otherwise specified, are to be 450 x 355 x 140 mm deep. Drainers are to be pressed out of single sheets and are to have pressed flutes to give complete drainage.

(a) For domestic use and for schools-Sinks shall comply with SABS Specification 242 and shall be manufactured from A.I.S.I. Type 430 stainless steel 0,8 mm thick for units not exceeding 2,4 m long and from stainless steel 1,2 mm thick for units exceeding 2,4 m long.

(b) For hospital use and school laboratories-Sinks shall be manufactured from A.I.S.I. Type 304 stainless steel 0,9 mm thick for units not exceeding 2,4 m long and from stainless steel 1,2 mm thick for units exceeding 2,4 m long.

Stainless steel wash hand basins and wash troughs shall be of the types and sizes specified complying with SABS Specification 906, with exposed surfaces buffed to a satin finish and sound deadened on underside by application of an approved sound deadening coating. Each basin or wash trough is to be fitted with integral built in overflow with chromium plated brass grating and 40 mm recessed waste outlet with chromium plated brass waste union with grating, rubber plug and chromium plated brass chain.

Stainless steel urinals shall be of the types and sizes specified complying with SABS Specification 924, and shall be manufactured from A.I.S.I. Type 304 stainless steel, 1,2 mm thick, buffed to a satin finish and sound deadened at back by application of an approved sound deadening coating. The back and sides of urinals are to be made rigid by means of integral pressed ribs or by bowing. Edges at sides and top are to have plaster key. Tread plates are to be ribbed and the front edges are to be stiffened and bent to form key for floor finish. The trough shall be a minimum of 125 mm wide and half round in section with all corners radiused and shall fall to ensure complete drainage to 75 mm recessed outlet with chromium plated domed hinged grating and frame.

RATES FOR SANITARYWARE: - shall include for the supply and fixing of the units as specified and for cleaning, washing and leaving in a satisfactory condition on completion.

BELOW GROUND WATER RETICULATION

Unplasticised polyvinyl chloride (UPVC) piping and fittings shall be of approved manufacture complying with SABS Specification 966. Pipes must be of the class specified and must be marked with the manufacturer's name, trade name or registered trade mark, nominal diameter, class reference and the SABS mark. Pipes shall be laid and jointed in accordance with the manufacturer's instructions.

High density polyethylene (HDPE) piping shall be of approved manufacture complying with SABS Specification 533 and shall be of the class specified, laid and jointed in accordance with the manufacturer's instructions. Piping must be jointed with compression fittings with compression rings and coupling nuts.

Fibre-reinforced cement pressure piping shall be of approved manufacture, complying with SABS Specification 1223 for Constant Outside Diameter Type and for Constant Inside Diameter Type. Pipes must be of the class specified and must be marked with the manufacturer's name, trade name or registered trade mark, nominal diameter, class reference and the SABS mark. Fittings for fibre-reinforced cement pressure pipes must be of grey cast iron and comply with SABS Specification 546. Each fitting must be legibly marked with the manufacturer's name, trade name or registered trade mark, the nominal diameter and the SABS mark. Pipes shall be laid and jointed in accordance with the manufacturer's instructions.

Polypropylene piping shall be of approved manufacture, complying with SABS Specification 1315, laid and jointed in accordance with the manufacturer's instructions. Piping must be jointed with compression fittings with compression rings and coupling nuts.

Copper piping shall be of approved manufacture complying with SABS Specification 460 and shall be of Class 2, laid and jointed in accordance with the manufacturer's instructions. Pipes must be jointed with brass compression fittings with compression rings and coupling nuts complying with SABS Specification 1067 Part I Type A. Copper piping must be bent, where required, with an approved bending machine.

ABOVE GROUND WATER SUPPLIES

Galvanised mild steel piping for water supplies shall be medium quality screwed and socketed normalised welded mild steel pipe, galvanised inside and outside, and shall comply with SABS Specification 62.

Fittings to galvanised mild steel piping shall be steel pipe fittings complying with SABS Specification 62 or malleable cast iron fittings complying with SABS Specification 509.

Copper piping shall be of approved manufacture, complying with SABS Specification 460 and shall be of Class I, fixed and jointed in accordance with the manufacturer's instructions. Unless otherwise described copper piping must be jointed with brass compression fittings with compression rings and coupling nuts complying with SABS Specification 1067 Part I Type A. Where so described, capillary copper in 5 complying with SABS Specification 1067 Part II must be used strictly in accordance with the manufacturer's instructions. Hard drawn copper piping of class 0 may be used where described but bending of the pipe will not be permitted.

Stainless steel piping shall be of approved manufacture, complying with BS 4127 and shall be A.I.S.I. Type 304 L. Fittings to stainless steel piping not exceeding 50 mm nominal bore shall be brass compression fittings with compression rings and coupling nuts.

Piping exceeding 50mm nominal bore shall be welded piping with 1,5 mm wall thickness, unless otherwise stated, and of A.I.S.I. Type 316 stainless steel. Joints are to comprise approved A.I.S.I. Type 316 stainless steel pressed collars welded to ends of pipes and fittings with loose galvanised mild steel slip-on flanges, drilled to Table D, complete with galvanised mild steel bolts, nuts and washers, and neoprene gaskets. Fittings must be A.I.S.I. Type 316 stainless steel butt weld fittings.

Phosphoric acid based fluxes must be used for all welded joints which are to be argon arc TIG welded using Type 316 filler rods, with the welds treated with suitable pickling compound.

WATER TAPS AND VALVES:-Water taps, stopcocks and wheelvalves shall be of approved manufacture complying with SABS Specification 226.

Ball valves with brass valve and copper or plastic ball float shall be of approved manufacture complying with SABS Specification 1056. Plastic floats when supplied, must comply with SABS Specification 1006.
Gate valves shall be of approved manufacture complying with SABS Specification 664. Valves shall be clockwise closing with non-rising, cap-fitted spindles and flanged connections and of the class specified.
Pressure reducing valves shall be of approved manufacture complying with SABS Specification 198.

FIXING OF WATER PIPES: - Galvanised mild steel water piping shall be fixed, unless otherwise described, to walls or ceilings with galvanised malleable iron holderbats (schoolboard pattern), built into walls in 1:3 cement mortar. Pipes shall be fixed to timber work with galvanised mild steel pipe clips screwed on.
Copper and stainless steel water piping shall be fixed, unless otherwise described, to walls or ceilings with brass holderbats. (schoolboard pattern) built into walls in 1:3 cement mortar Pipes shall be fixed to timber work with brass or copper pipe clips screwed on.

CONCRETE THRUST AND ANCHOR BLOCKS: - shall be of the sizes required and provided where directed to anchor the water pipelines against the thrust due to hydrostatic pressure. Concrete blocks shall be cast against the undisturbed face of the excavation. Backfilling behind the thrust face of the block will not be permitted.

TESTING OF WATER MAINS:-The whole of the water reticulation shall be subjected to a hydraulic test pressure 1,5 times the maximum working pressure of the pipeline. Testing of pipe-lines may only commence after the installation of all anchor blocks, valves and fittings has been completed.
Testing shall be carried out between installed sluice valves whenever possible. Where this is not possible the ends of the pipes shall be sealed with end caps properly held in place with temporary props.
The tests shall be carried out on lengths not exceeding 300 metres.
The pipeline shall be filled from the lowest end in order to expel the air at the upper end through special taps or through service connections, stand pipes, etc. When full the line shall be allowed to stand for 24 hours and any further accumulated air shall be expelled. The full test pressure shall then be applied and maintained for one hour, during which time the line will be examined for any leaks, movement at anchors and other defects.
Any defective work is to be taken out and replaced at the Contractor's expense and the whole retested until found satisfactory.
The Contractor shall provide all necessary testing apparatus, temporary end caps, plugs, stoppers, special taps and any other materials that may be required, and all labour for carrying out the tests.

EXCAVATIONS FOR PIPE TRENCHES: - Excavations for pipe trenches, gulley traps, manholes, inspection chambers, valve chambers, soakpits and septic tanks shall be to the depth and gradients shown on the drawings using sight rails and boning rods and shall include for taking precautions against collapse of sides of excavations, staging, pumping and baling to keep the excavations free from water or mud and for filling in and ramming.
The bottoms of pipe trenches are to be excavated to even falls. The barrel of the pipe, except where it is laid on a sand or concrete bed, must rest on solid ground and hand-holds of sufficient size must be cut under pipe joints to enable the jointing and filleting to be properly performed. Any excavations taken out deeper than required shall be made up to the correct grade with well rammed earth. In intermediate or hard rock excavation and where a bedding is not specified, the trench bottom must be excavated 100 mm deeper than required for the grade and be backfilled with well rammed earth.
The Contractor is to notify the Director when the trenches are ready for inspection and approval. Any work put in hand before approval has been given shall, if so required, be replaced with new at the Contractor's expense.
Notwithstanding such approval of the trench bottoms, any excavations which become water-logged or otherwise spoilt after approval, shall be cleaned out and reformed at the Contractor's expense and to the satisfaction of the Director before any piping or sand or concrete beds are laid.
Depths of excavations as approved shall be checked and recorded by the Works Supervisor or Inspector of Works and the Contractor before excavations are filled in.
For the purpose of any measurement, whatever size may have been excavated, excavations are taken as follows: -
Trenches not exceeding 0,75 m deep shall be taken 0,5 m wider than the internal diameter of the pipe. This width shall be increased by 75 mm for each successive depth of 0,75 m to a maximum of 1 m wider than the internal diameter of the pipe.

BACKFILLING: - No trench shall be backfilled until the Director is satisfied that the works therein have been satisfactorily completed, tested and are ready for backfilling.
The backfilling around and 300 mm above the pipe is to be of approved selected material, imported if necessary, free from rock or stone, carefully packed, watered and lightly rammed equally on either side of the pipe and then filled in above this level with suitable material from the excavations, watered and compacted in layers not exceeding 300mm thick with the top 300mm consolidated to dry density of not less than 95 % MOD. A.A.S.H.O. density. Top soil from the excavation is to be set aside and used in the final layer of backfilling.
Any disturbance of or damage to the pipes during backfilling must be made good by the Contractor at his own expense.
All spoil from the excavations for trenches, etc., shall be deposited and levelled on site or carted away as directed. Any subsidence or depressions below the level of the adjacent ground shall be filled up, as and when necessary, until the end of the maintenance period.

SIZES OF PIPES:-The diameters stated for galvanised mild steel piping, cast iron piping, vitrified clay piping and

asbestos cement pressure piping (C.I.D.) are the nominal internal diameters. The diameters stated for all other pipes are nominal external diameters.

In the case of piping and fitting which are manufactured in imperial diameters, the size nearest the metric equivalent must be used.

RATES FOR PIPES: - Rates for all pipes, gutters, channels, etc., are to include for couplings in running lengths, joints, short lengths and cutting and fixing as required. Rates for mild steel pipes shall include for all plain sockets and nipples. Where fittings have reduced ends or branches, the fittings are described as "reduced" and the largest end or branch has been stated. The Contractor may use equal fittings with reducers or bushings if he so desires, but no claim for extras in this connection will be entertained.

Rates for pipes fixed to walls, soffits of slabs, roof timbers, etc., are to include for all brackets, holderbats, pipe clips and approved extended hangers where pipes are required to be laid to falls and for plugging and screwing or for cutting and pinning or building in tails of holderbats.

Rates for piping are to include for cleaning down at completion, and in addition, the rate for stainless steel piping is to include for polishing exposed piping, all to the approval of the Director.

RATES FOR CHASES, HOLES ETC.: -are to include for making good to approval. The term "hole" is to include for sleeves where required through concrete work.

FIRE EXTINGUISHERS: - Where specified, carbon dioxide gas type fire extinguishers shall be 2,26kg type, complying with SABS Specification 889 and fixed in position on wall brackets screwed to and including 20mm thick chamfered and oiled wrot hardwood backboard, size 450 x 100 mm screwed to plugs in wall.

Where specified, dry powder type fire extinguishers shall be of 10 litre capacity, complying with SABS Specification and fixed as before described on backboard size 1000 x 200mm.

FIRE HOSE REELS: - shall be non-swinging rotary fire hose reels, complying with SABS Specification 543, with solid side discs and 25 mm waterway at bracket incorporating rotary pressure joint to hose connection at hub and fitted with 25 mm screwed malleable iron 'Sanders Type A' valve with "S" grade diaphragm, connection for supply pipe with the handwheel clearly marked in red with arrows and the words "OPEN" "OOP"

The reel is to be secured to the wall with and including three steel anchor bolts and fitted with 30 m length of 20 mm internal diameter best quality reinforced red rubber non-kinkable hose with one end fixed to wheel hub connection and the other end fitted with 20 mm chromium plated gunmetal adjustable "Centorium" type nozzle with hose threaded through and including chromium plated hose guide, designed to permit the hose to run out in any direction and the nozzle supported on and including chromium plated bracket fixed to wall.

FIRE HYDRANTS: - shall be of the wheel valve pattern with instantaneous coupling outlets, size 63,5 mm or 70 mm as stated on the drawings. Hydrants fixed in a horizontal position shall have oblique angle outlets and those fixed in a vertical or inclined position shall have right angle outlets. Materials used in the manufacture of the hydrants shall be as laid down for the manufacture of couplings, branch pipes, etc., in SABS Specification 1128, and the various requirements of instantaneous couplings and dimensions for 70 mm outlets shall comply with the requirements for Morris instantaneous pattern couplings.

The valve spindle shall have a minimum diameter of 22 mm with swivelling clack at one end fitted with first quality dextine or other approved washer, bedded on to a raised seat not less than 6 mm wide, and the other end shall be machined to form a square shank of 15 mm minimum thickness and a length corresponding with the thickness of the boss of the handwheel; the portion protruding from the boss shall be threaded and fitted with a washer and nut to hold the handwheel firmly in place. Valve inlet shall be male screwed 80mm Whitworth pipe thread, and outlet shall be fitted with approved india-rubber coupling gasket. The internal diameter of the valve body shall be not less than 95 mm in the case of 63,5 mm outlets or 100 mm in the case of 70 mm outlets.

The valve handwheel shall have an overall diameter of 165 mm and the rim shall be of oval cross-section and shall have the words "OPEN" and "OOP" together with direction arrows embossed on the face.

All hexagonal faces shall be machined and all exposed surfaces of the valve and the wheel periphery shall be buffed and polished. Parts of the wheel not polished shall be painted two coats bright red high gloss paint.

The completed hydrant valve shall be guaranteed hydraulically tested by the manufacture to a pressure of 35 bar and shall be badged or stamped accordingly with the manufacturer's name or symbol and the words "TESTED 35 bar".

GLAZING

MATERIALS: - Glass shall conform to the requirements of the relevant current British Standards

Specification for the respective materials.

Clear glass shall be float quality glass.

Silvered glass mirrors are to comply with SABS Specification 1236 Class A. Toughened safety glass is to be "Armourplate" float quality safety glass of the thickness specified and as manufactured by Armourplate Safety Glass (Pty) Ltd., or other approved, and glazed to sashes, etc., in strict accordance with the manufacturer's instructions.

All toughened safety glass is to have the manufacturer's name or motif sand-blasted in one corner of each pane.

Laminated safety glass is to be float quality normal strength glass, unless otherwise stated, and of the type specified and as manufactured by Shatterprufe Safety Glass Co. (Pty) Ltd., or other approved, and glazed to sashes, etc., in strict accordance with the manufacturer's instructions.

All laminated safety glass is to have the manufacturer's name or motif sand-blasted in one corner of each pane.

All glass is to be free from imperfections and is to be left in a thoroughly clean condition on completion.

GLAZING: -The glazing and fixing of glass in buildings shall be in accordance with SABS Code of Practice 0137.

Glass panes shall have adequate glazing clearance between edges of glass and the rebates.

Putty for glazing shall comply with SABS Specification 680 Type I for glazing in wood and Type II for glazing in steel. Putty for glazing in natural finished wood shall be tinted to match the colour of the wood. Putty for glazing in aluminium windows shall be tinted to match the aluminium or anodised aluminium.

All rebates, other than in natural finished hardwoods, are to be primed before glazing. Glass fixed with glazing beads shall be well bedded in back putty in the rebates.

Putty shall be carefully trimmed and cleaned off with front putty worked to within 3 mm of the sight lines.

RATES:- Rates for glass generally shall include for preparing the rebates, etc., all putty, sprigs, clips, etc., as required and all cutting.

Rates for toughened and laminated glass shall include in addition for all necessary spacing and setting blocks in accordance with the manufacturer's requirements.

PAINTING

MATERIALS: - Proprietary materials where specified are to be of the brand specified or other approved by the Director.

All primers, emulsion paints, enamels, stains, varnishes, etc., are to comply with the relevant SABS Specification. Paints, etc., shall be suitable for application on the surfaces to which they are being applied and those used externally shall be of exterior quality or suitable for exterior use.

For any particular work the priming coat and subsequent coats of paint are to be executed with paints from the same manufacturer and in accordance with that manufacturer's instructions.

The materials are to be brought to the site in unopened containers and no adulteration will be permitted, except thinners of a quantity and quality directed by the manufacturer.

The Director shall at all times be permitted to take samples for testing purposes from open containers of any brand of paint being used on the work.

All materials, if and when required by the Director, will be subject to tests by the South African Bureau of Standards, and the cost of such tests, should the material under test not meet the requirements of this specification, shall be borne by the Contractor.

Fillers and stoppings are to be suitable for use with the material being filled or stopped and to the approval of the Director.

PREPARATORY WORK: - All new and existing surfaces are to be thoroughly dry and are to be cleaned of all dust, dirt, grease, oil, rust, scale, efflorescence, fungus, loose or flaking material, etc., rubbed down, stopped, filled, knotted and sanded smooth as required in accordance with the paint manufacturer's recommendations and to the approval of the Director prior to the application of paint, etc.

Ceilings are to have nail heads, including those to cornices and cover strips, primed and stopped up as necessary and rubbed down smooth.

Asbestos cement shall be primed with an approved alkali resistant primer before the application of subsequent coats which are not, in themselves, alkali resistant.

Iron, steel and other ferrous metals shall be cleaned in accordance with SABS Code of Practice 064 to remove rust, scale, grease, oil, etc., and the surface brought to a bright metallic condition.

Galvanised iron and zinc shall be cleaned in accordance with SABS Code of Practice 062 to remove the manufacturer's temporary protective coating, white rust, etc.

Other non-ferrous metals shall be thoroughly cleaned to remove all milling oils, temporary protective coatings, etc., and the surface abraded with fine waterpaper and white spirit.

Woodwork to be painted shall have all knots and resinous areas treated with an approved knotting, the surface shall then be primed and all holes, etc., stopped and rubbed down smooth.

Woodwork to be oiled, stained, varnished, etc., shall be free of all stains, pencil marks and other surface discolourations and all holes, etc., stopped with tinted stopping and rubbed down smooth.

In preparing existing glazed sashes and sash doors, all loose putty is to be removed, the rebates primed and glass re-sprigged and re-puttied as necessary before the repainting is commenced.

Previously distempered or lime washed surfaces to receive any other type of paint, are to have the existing distemper or limewash completely removed by scraping or wirebrushing and the surfaces treated with an approved bonding liquid.

Where existing paint films are in good condition any flaking or bared patches are to be properly feathered into the surrounding paint and spot primed as necessary.

Where existing paint films are in poor condition and require to be removed completely, they are to be removed by means of wire brushing, paint remover, burning off, or other approved method. Paint removers shall be free of wax and caustic substances and shall preferably be of water rinsable type. When burning off paint from wood, care must be taken to avoid charring the wood.

The final state of preparatory work to existing decorated surfaces shall in all cases produce in the finished decorated surfaces a condition similar to new work.

The Contractor will be held responsible for the proper and adequate preparation of the surfaces and any work which fails to meet the manufacturer's recommendations must be made good at the Contractor's expense to the satisfaction of the Director.

APPLICATION OF PAINTS, ETC.: -Painting may be carried out by brush, roller or spray as recommended by the manufacturer and to the approval of the Director.

All paints, etc., are to be applied in strict accordance with the manufacturer's instructions.

Each coat of paint is to be adequately and permanently keyed onto the previous coat or surface and shall be evenly distributed and continuous and shall dry to a smooth film, free from sags, runs or other imperfections.

Each coat of paint is to be of a colour distinctive from previous or succeeding coats.

All painting must be done in accordance with a colour scheme which will be provided by the Director, and rates for painting etc., are to include for all cutting in of contrasting colours and masking as required. No distinction has been made where more than one colour of the same material is required on the walls or ceiling of the same room.

Samples of colours for the final coats are to be prepared in all cases to the approval of the Director and all work must be finished to the approved colours.

Backs of wood door and similar frames and the surfaces of other new or refixed joinery in contact with brickwork, etc., and built in as the work proceeds, shall be primed or sealed before building in to prevent moisture seeping into the wood from the mortar bedding.

Tongued and grooved and rebated edges of boards in batten doors and other such like inaccessible parts of new joinery shall, before assembly, be primed, or where the joinery is to receive a finish other than paint, be given one coat of such other finishing material.

All new external structural timbers shall be primed before the timbers are fixed in position and shall include all surfaces such as backs of fascias and bargeboards.

RATES: Rates for painting, etc., are to include for all preparatory work, and where spraying is employed, are to include for adequately masking all surrounding areas.

Where diameters of pipes are stated these are the nominal internal diameters, and rates for painting pipes are to include for painting the holderbats, hangers, clips, etc., supporting the pipes.

Rates are to include for providing all necessary dust sheets, covers, etc., taking all necessary precautions to prevent marking the surfaces of joinery, walls, floors, glass, electrical fittings, etc. All surfaces disfigured or otherwise damaged shall be completely renovated or replaced as necessary to the approval of the Director at the Contractor's own expense.

ROADWORK

The Contractor is referred to the preambles for "Earthworks" with particular reference to the full description, intent and meaning of the classification for excavations and the preambles for "Concrete, Formwork and Reinforcement". The construction of the roads is to be carried out by an approved Specialist Sub-Contractor in accordance with the following specifications and all to the approval of the Director.

SUB-GRADE: - All materials placed in the sub-grade layer which is defined as being the 150 mm thick layer immediately below the sub-base or the base course (where no sub-base is specified), shall conform to the following specification: -

- | | | | |
|-----|--|-------|--------|
| (a) | Minimum C.B.R. at 93 % Mod. A.A.S.H.O. density | = 10% | |
| (b) | Maximum C.B.R. Swell | | = 1,5% |
| (c) | Maximum Plasticity Index if: - | | |
| | more than 30 % passes the 2 mm sieve | = 12 | |
| | less than 30% passes the 2 mm sieve | = 16 | |

The sub-grade layer in cut areas shall be treated in place either to achieve a uniform standard of compaction or to break up undesirable formations of hard rock.

In the case of materials other than hard rock, treatment in place shall consist of scarifying or otherwise loosening to a depth of 150 mm and recompacting to a density of 93 % Mod. A.A.S.H.O. where directed, with the material stabilised in place before compacting.

In hard rock, treatment in place shall consist of thoroughly loosening to a depth of 450 mm by ripping or blasting and then sized by rolling or knapping until the maximum dimension of any spall shall be not more than 300 mm. Compaction of the rock in the sub-grade shall be achieved by spreading and sorting by bulldozer to a reasonable uniform thickness with sufficient fine material added to fill the voids and blind the surface.

Compaction shall be achieved by means of a vibratory roller until the Director is satisfied that the mass is sufficiently dense to provide a stable sub-grade layer.

Density tests shall be carried out at the minimum rate of one test per every 500 m² of sub-grade area or not more than 50 m apart but not less than four tests for smaller areas and shall assess the full layer thickness. The costs of such control tests shall be included in the Contractor's rate for sub-grade treatment. The Director may, at his discretion, arrange for independent check tests to be performed, but the costs of the tests in this instance will be borne by the Administration.

Processing of the material will be measured under the relevant items. An approved total weedkiller shall be applied during the formation of the sub-grade. The rate of application shall be in accordance with the manufacturer's specification.

Rates shall include for the supply, delivery, spreading and stabilisation with lime, if required, and compacting and shaping to correct lines and levels.

The lime and method of mixing and watering shall be as described in the specification for stabilisation.

SUB-BASE: - All material placed in the sub-base layer, which is defined as being that layer of 150 mm thickness immediately below the base course layer, shall conform to the following specification: -

	Unstabilised	Stabilised
Minimum C.B.R. at 95 % Mod. A.A.S.H.O.		
Density	50 %	70 %
Minimum C.B.R. Swell	0,5%	0,5%
Maximum Plasticity Index	10	10
Minimum Liquid Limit	35 %	35 %
Maximum size of aggregate	63mm	63mm
Material passing the No.75 micrometre sieve shall not exceed	25 %	
Minimum relative compaction in place	95 % Mod. A.A.S.H.O. density	

Combined coarse and fine sand fractions shall exceed 35 % of the soil mortar

Unless otherwise specified, the responsibility for obtaining material that conforms with the above specification rests with the Contractor who will be required to perform his own tests to prove compliance, and to submit samples to the Director before the material is delivered on site. Further control tests will be required by the Director during the placing and compaction of the material, the locations of which will be selected at random.

Should the Contractor wish to use material from the site excavations, he shall first obtain the approval of the Director. His rates shall in this case include for the selection and stockpiling.

Density tests shall be carried out at the minimum rate as specified for the sub-grade layer.

The layer shall be finished off to present a uniform texture and tightly bonded surface.

Rates shall include for the supply, delivery, spreading and stabilisation with lime, if required, and shaping to correct lines and levels.

The lime and method of mixing and watering shall be as described in the specification for stabilisation.

The finished surface shall be within 20 mm of the design level. The finished width shall not be less than the design width. The average of five thickness tests at the rate of one test for every 200 m² of surface shall not be less than

150 mm and at any point not less than 130 mm.

The surface finish when measured under a 3 m straight edge shall have no slacks or bumps greater than 5mm.

The cost of the density control tests shall be included in the Contractor's rate for sub-base construction. The Director at his discretion, may arrange for independent check tests to be conducted, and the costs in these instances will be borne by the Administration.

STABILISATION:-The stabilisation agent shall be slaked lime of the calcium type conforming to the requirements of SABS Specification 824.

The rate of application shall conform to the design rate and all materials to be stabilised shall be approved by the Director before processing.

The material shall be spread in a uniformly thick loose layer over the full area and thoroughly dried by scarifying or blading with a grader to ensure exposure to the air of all particles and to ensure thorough mixing to obtain a uniform grading of the material.

When the material has been approved as being ready for stabilising it shall be lightly rolled to facilitate the spreading of the lime. The lime shall be evenly applied to the surface, preferably by mechanical spreader, at the specified rate and thoroughly mixed by rotavator or disc harrow until a uniform integrated mixture of uniform colour is obtained over the full depth of the layer.

Before mixing is commenced the Contractor shall satisfy the Director that the lime has been applied at the specified rate.

Immediately after the lime has been mixed in, water shall be added in small increments by suitable watering equipment and mixed into the layer until the required water content has been obtained which shall not exceed the Mod. A.A.S.R.O. optimum plus 2%.

The efficiency of the spreading and mixing shall be measured by the Lime Determination Test according to A.S.T.M.D. test number 3155/1973 or the California Test Method No. 338-B July 1966. Only where the result from every 15 tests at locations selected by the Director indicate that more than 90 % of the layer has a lime content exceeding 60 % of the nominal lime content will the work be accepted, provided that the coefficient of variation shall not be greater than 25%.

The test positions shall be spaced at one for every 100 m² of surface area, but shall not be spaced greater than 20 m apart.

BASE COURSE:-When the sub-grade has been prepared and approved, the base course, consisting of one of the following, shall be formed to the compacted thickness specified.

Crusher Run Base Course

Crusher-run base course shall be fresh dolerite, hard blue tillite, quartzite, fresh granite, fresh basalt or other stone which meet the following specifications.

Sieve Size	% Passing
37.5 mm	100
26.5 mm	82-95
19.1 mm	70-85
13.2 mm	58-75
4.75 mm	34-55
2.00 mm	22-40
0.425 mm	10-25
0.075 mm	5-12

Minimum C.B.R. @ 98% Mod. A.A.S.H.O. density	80%	
Maximum C.B.R. Swell		0,5%
Maximum Liquid Limit		25
Maximum Plasticity Index		4
Maximum Linear Shrinkage	2	
Minimum Sand Equivalent Value		30
Maximum Flakiness Index		35

The soundness of the aggregate shall be such that after 5 cycles using Magnesium Sulphate it shall not show a loss of more than 15 % by weight.

The maximum Aggregate Crushing Value should not exceed 30.

The moisture content used for field compaction shall not exceed the Mod. A.A.S.H.O. optimum plus 2%.

Natural Ground Base Course

Natural ground base course shall be approved stone which meets either of the following specifications.

Natural Gravel (Unstabilised)

Minimum C.B.R. at 98% Mod. A.A.S.H.O.	80 %
Minimum C.B.R. Swell	0,5 %
Group Index value	0
Maximum Plasticity Index	4
Maximum Liquid Limit	35
Maximum Linear Shrinkage	2
Minimum Sand Equivalent Value	30

Maximum size of particle	53mm
Material passing No.75 micrometre sieve shall not exceed	25 %
The combined coarse sand and coarse fine sand fraction shall not exceed 35 % of the soil mortar	

Natural Gravel (Stabilised with Lime)

Lime must comply with SABS Specification 824

Minimum C.B.R. at 98 % Mod. A.A.S.H.O. density provided that the minimum C.B.R. before stabilising, at 95 % Mod. A.A.S.H.O. density	160	140	120
	30	45	60

Maximum C.B.R. S well	0,5%
Maximum Plasticity Index	4
Maximum particle size	2/3 layer thickness
Maximum percentage passing No.75 micrometre sieve	25
Grading Modules	1,5

The responsibility for obtaining suitable base course material complying with the above rests with the Contractor, unless otherwise specified, and the provisions for sub-base material in regard to tests, etc., to prove compliance with the specification shall apply to the base course.

During construction the base course shall be evenly distributed over the sub-grade. The stone shall then be rolled with a 4 to 5 tonne roller or equal unless otherwise instructed. After a few passes of the roller the surface shall be checked for shape, camber and levels and all depressions filled in. Rolling and trimming shall continue until the surface is true to required levels and falls.

Minimum density in place after compaction shall be 98 % Mod. A.A.S.H.O. density.

CHIP AND SPRAY SURFACING

Binders

One of the following may be used: -

- M.C. 3000 Bitumen to SABS Specification 308 (150/200 Pen.)
- M.C. 800 Bitumen to SABS Specification 308 (150/200 Pen.)
- RTH 45/50 Tar to SABS Specification 748

Spray grade 60% emulsion where approved or specified by the Director. If emulsion is used then the specified application rates shall be increased to give the required net bitumen content.

Cover Aggregate

All cover aggregate used in the surface treatment work shall be washed 13,2 mm nominal sized crushed stone in accordance with SABS Specification 647.

The Aggregate Crushing Value shall not exceed 15.

The binder shall be applied after the prime coat has dried completely and all tackiness has vanished.

The binder is to be applied by means of a distributor at a rate of 1,1 litre/m² followed immediately afterwards by the spreading of a cover aggregate of 13,2 mm stone at the rate of 125 m²/m³. The aggregate is to be spread by means of an approved chip spreader, hand spreading will only be permitted in those areas inaccessible to the spreader. The aggregate is to be rolled immediately with two passes of a pneumatic tyred roller. When the binder has set the surface shall be drag-broomed twice in each direction and then rolled again with four passes of the roller during the heat of the day or until the aggregate is firmly keyed into a tight surface.

DOUBLE SEAL COAT WITH BLACK TOP SURFACING: -

The prime and first seal coat shall be applied as previously specified.

After the first seal coat has been drag-broomed and rolled as previously described, the binder shall be applied to the surface at a rate of 0,8 litre/m² followed immediately by the spreading of 6,7 mm stone chips at the rate of 150 m²/m³. This stone aggregate shall then be drag-broomed and rolled as previously described.

A seal spray having a net bitumen content of 0,7 litre/m² shall then be applied to the surface when this coat has dried completely and shall be rolled to firmly bed any loose aggregate.

If the surface is to be opened early to traffic, it shall be covered very lightly with sand or crusher dust distributed evenly with a hessian drag and back rolled with wet wheels before opening to traffic.

SLURRY SEAL SURFACING-The aggregate for slurry seal shall conform to the following grading: -

Sieve Size (mm)	Percentage Passing
4,75	100
2,36	90-100
1,18	65-95
0,600	42-72
0,300	23-48
0,150	10-27
0,075	5-12

Slurry sand shall be crusher sand with a minimum sand equivalent of 35.
Binder-Stable grade emulsion (60%)

- Anionic to SABS Specification 309
- Cationic to SABS Specification 548

Consistency of the slurry shall consist of 90 % crusher sand, cement filler not less than 1 % and net binder content of not less than 9 % by weight. Water to be added as required. As a guide approximately 300 litres of emulsion and 160 litres of water are required per cubic metre of slurry.

The slurry shall be machine mixed and wherever possible applied by means of a spreader box. The rate of application shall be 170m²/m³. The slurry shall be of a creamy, homogeneous mixture, free of lumps, and if the mixture shows signs of breaking before application to the surface it shall be discarded.

After the first seal has been approved by the Director but before the application of the slurry, a fog spray comprising of a solution of 1 part emulsion to 3 parts water shall be applied at a rate of 0,8 litre/m² to cover the aggregate. The application of the slurry may commence when the fog spray has completely dried.

To assist with the spread of the slurry and to smooth out squeegee marks the slurry shall immediately after being applied and before it has broken, be smoothed by a damp hessian drag either attached to the spreader box or pulled over by hand.

After the slurry has set it shall be covered by two passes of a pneumatictyred roller during the heat of the day.

The permissible variation in the application of the slurry shall not vary from the specified rate by more than 10%.

PREMIX TARMACADAM SURFACING

Prime Coat

When the base course is complete and dry it shall be cleaned of all loose material and be given a prime coat of one of the following primers: -M.C. 30 cut-back bitumen.

- Tar Primer R.T.R. 3/P.
- Emulsion Primer (60%).

The rate of application of the primer shall be within the range 0,65-1,0 litre/m², the actual rate to be determined by test and observation on site. Where emulsion primer is used the application rate shall be increased to give the required net bitumen content.

Hand spraying shall be used only in those areas inaccessible to mechanical distributors.

Before spraying is commenced the surface shall be lightly watered to settle dust.

Single Coat Premix Tarmacadam

When the prime coat has dried the single coat premix wearing course, of the compacted thickness specified, shall be constructed.

The wearing course shall be Type A (Hot Mix), unless otherwise specified or approved by the Director, and shall conform with the following specification:-

	Screen Size mm	A Hot Mix	B Cold Mix	C (Kerbs)	
Aggregate Grading	26.5	100	-	-	
	19.0	100	-	-	
	13.2	80-100	100	-	
	9.5	70-90	80-95	100	
	6.7	-	60-75	90-100	
	4.75	50-70	45-60	65-75	
	Per Cent Passing	2.36	35-50	28-42	52-62
		1.18	27-40	18-30	50-60
		0.600	19-30	7-20	45-55
		0.300	13-23	2-10	30-40
	0.150	8-16	0-5	9-19	
	0.075	4-10	0-4	4-8	
Grade Binder		60/70	Emulsion	60/70	
Nominal Nett Binder Content		5.5% ± 0.38	4.75% ± 0.3	5.5% ± 0.3	

Penetration grades to comply with SABS Specification 307.

Cut-back bitumen to comply with SABS Specification 308.

Maximum heating temperature of bitumen 170 °C.

Delivery temperature at the paver for hot mixes 130 -160°C.

For every 500 m² of area paved the Contractor shall produce an extraction test result from a sample taken during laying operations showing grading and bitumen content of the premix carpet. The test as specified or any further tests to prove compliance with the specification shall be at the Contractor's expense.

In order that the stone and binder shall be properly mixed, this operation must be carried out in a pug-mill mixer or by hand with shovels in wheelbarrows or on metal plates, in which case the binder must be added in the correct proportions in small quantities. Mixing shall continue until the aggregate is uniformly coated with the binder.

Bituminous surfacing shall not be carried out in rain weather nor when atmospheric shade temperature is below 10 °C. Immediately after mixing, the surfacing materials must be spread and rolled on the same day. Spreading shall be done evenly over the base to ensure a consolidated thickness as specified and shall be performed by means of a mechanical spreader or by a drag spreader, or by hand, using rakes and screeds.

Where hand spreading is used, the premix must not be dumped on the base, but taken from the boards on barrows by shovel and then evenly distributed over the base. Hand raking must be reduced to a minimum to avoid segregation of aggregate. Rolling shall commence as soon as the binder has set sufficiently and, unless otherwise instructed, this shall be done with a 4 to 5 tonne roller or equal.

Places inaccessible to a roller may be compacted by means of 12 kg tampers. The surface shall be rolled true to line and level without slacks or irregularities.

After three days the rolling shall be repeated during the hottest part of the day and a light application of fines may be added during the final rolling.

Premix Tarmacadam Kerbs

Premix kerbs are to be Type C as specified above and constructed to give the following compacted size: -

Width at top	125 mm
Width at base	230 mm
Height	150 mm

PRECAST CONCRETE PAVING BLOCKS: - shall be of the type, class and thickness specified, of approved colour and shall comply with SABS Specification 1058. Paving blocks which fail to meet these requirements must immediately be removed from the site and replaced at the Contractor's expense to the satisfaction of the Director.

Paving blocks shall be one of the following types as specified: -

Type S-A: - allows geometrical interlock between all vertical faces of adjacent blocks.

Type S-B: - allows geometrical interlock between - some vertical faces of adjacent blocks.

Type S-C: - allows no geometrical interlock between vertical faces of adjacent blocks.

Paving blocks shall be one of the following classes as specified:

Class 25: - average compressive strength of at least 25 MPa.

Class 35: - average compressive strength of at least 35 MPa.

Paving blocks are to be laid to approved patterns as specified and in accordance with the relevant clauses (excluding Clause 8) of SABS Specification 1200 MJ on and including a sand bed of the compacted thickness specified. After laying, the paving blocks are to be compacted by means of a vibrating plate compactor with the joints filled in, after compaction, by sweeping in jointing sand.

Sand for bedding shall conform to the following grading: -

Sieve size (mm)	Percentage passing
9,52	100
4,75	95-100
2,36	80-100
1,18	50-85
0,60	25-60
0,30	10-30
0,15	5-15
0,075	0-10

Sand for jointing shall pass a 1,18 mm sieve and shall contain 10-50 % of material that passes a 0,075 mm sieve. Spaces constituting less than 25 % of a full block unit and of 25 mm minimum dimension at perimeter edges of pavings against kerbs, buildings, inspection chambers, etc., are to be filled with Class B concrete trowelled to a smooth even surface to match paving blocks.

Rates for paving block pavings are to include for all straight cutting and waste, all half blocks at straight edges, filling with concrete as described, fitting, protecting from injury and cleaning down at completion.

KERBS

Generally

The kerbs are to be laid before the base course is commenced to the lines and positions as shown on the drawings. The Contractor is to allow sufficient time for the mortar bedding and joints to set and is to take all necessary precautions to maintain the line of the kerbs especially while rolling the base course and surfacing, as no claims in this connection will be considered.

Rates for kerbs are to include for necessary excavation, well consolidated bottom under kerbs and for filling and ramming to secure the kerbs in position.

Precast Concrete Kerbs

Precast concrete kerbs are to be of concrete Class 20 (20 MPa) and of the sizes described in the items, cast generally in 1 m lengths, and finished smooth off the mould on top edge and both sides, with angles rounded, and rates are to include for all necessary formwork and moulds. The kerbs are to be bedded on and including a mat of 1:3 cement mortar, and the abutting ends of the kerbs are to be fully jointed in a similar mortar and pointed with a keyed-in joint on top edge and exposed sides.

Brick on edge kerbs

Brick on edge kerbs are to be of extra hard burnt bricks of the colour specified. The kerbs are to project 10 mm above the finished Tarmacadam level and are to be bedded on a mat of 1:4 cement mortar, and the abutting ends of bricks are to be fully jointed in a similar mortar and pointed with a keyed-in joint on top and exposed sides.

FENCING AND GATES

GENERALLY: - The Director shall be responsible for the initial location and exposure of all necessary boundary beacons and their indication to the Contractor at the site handover. The Contractor shall be responsible for subsequently ensuring that these beacons remain undisturbed and that the fencing is correctly aligned between boundary beacons. Should, during setting out of the fencing, further boundary beacons be uncovered or located and reasonable doubt arise regarding the correct alignment of fencing, then the Contractor shall be responsible for immediately notifying the Director, in writing of such doubt in order that the setting out may be checked and rectified, if necessary.

All bushes, trees, old fencing, rocks, debris, long grass and other obstructions shall be removed from the fencing line to produce a clear even strip 500 mm wide on either side.

Trees, rocks or other items of horticultural or archaeological interest which are not to be removed will be indicated by the Director.

Straining posts shall be erected at ends, corners and intermediately at not exceeding 45m centres with standards or intermediate posts erected between posts at not exceeding 3 m centres.

Where fences are erected directly over boundaries, corner beacons shall be preserved by splaying the corner by planting two straining posts, each with one stay, 1 m from the beacon peg.

Security fences (i.e. fences with projecting overhangs) shall be sited 350 mm back from the boundary line so that the end of the overhang is exactly on the boundary line.

Chain link wire mesh fencing and wire shall comply with SABS Specifications 675 and 1373 and shall be as specified, either Type 1 which is to be fully galvanised to Class A, or Type 2 which is to be lightly galvanised to Class C and PVC coated.

Chain link wire mesh fencing shall have a mesh size of 50 mm and be of the height and type specified. Type 1 galvanised wire mesh fencing shall be woven from 2,5 mm diameter wire, and Type 2 PVC coated wire mesh fencing shall be woven from 2,5 mm diameter core wire PVC coated to an overall diameter of 3,3 mm. The edges of wire mesh rolls shall be clinched and each roll shall have a durable label attached indicating the manufacturer's name, type and description, nominal diameter of wire, nominal width and length of roll and size of mesh. Wire for lacing of wire mesh to posts, gate framing, etc., must be identical to the wire forming the wire mesh fencing. The wire mesh fencing shall be tied at 450mm centres to straining wires with binding or tie wire.

Straining wire shall be as specified, either Type 1 galvanised wire of 3,15 mm diameter or Type 2 PVC coated galvanised wire with 3,15 mm diameter core wire PVC coated to an overall diameter of 3,95 mm. Stainless steel straining wire where specified shall be 2,50 mm diameter A.I.S.I. Type 304 stainless steel. The bottom straining wire shall in all cases be fixed 50mm above levelled ground and each straining wire shall be strained between posts and tied to same by turning each wire twice around the post and tying off by twisting it a minimum of three turns around the strained wire.

Binding or tie wire shall be as specified, either Type 1 galvanised wire of 2 mm diameter or Type 2 PVC coated galvanised wire with 2 mm diameter core wire PVC coated to an overall diameter of 2,80 mm.

Galvanised barbed fencing wire shall consist of two strands of 1,60 mm diameter high tensile steel wire twisted together with barbs at 125 mm centres and each row of barbed wire shall be strained between posts and tied to same by turning each wire around the post and tying off by twisting it a minimum of three turns around the strained wire.

Galvanising shall comply with SABS Specification 763 and all items of posts, stays, gate framing, etc., described as galvanised shall be hot dipped galvanised after fabrication with Class A galvanising with all internal and exterior surfaces fully coated.

Mild steel tubing for fencing and gate components shall comply with SABS Specification 657 Part I. The diameters specified are the nominal external diameters of the tube.

Galvanised mild steel tubular straining, gate and intermediate posts, stays and standards shall comply with CKS 82 unless otherwise described. Posts and stays shall be fitted with base plates of the sizes stated, welded on at bottom with each base plate holed 25 mm diameter in centre to permit intrusion of galvanising. Tubular posts, etc., not exceeding 51 mm external diameter are to be fitted at top with a machined steel plug pressed or welded into end of post. The top end of posts, etc., exceeding 51 mm external diameter are to be capped with a 1,60 mm thick pressed mild steel domed cap welded on. Gate posts are to be drilled and fitted with mild steel ferrules welded into position to receive 20 mm diameter mild steel hinges. Stays shall have the top end flattened, bent as required and holed 12 mm diameter for bolting to post. Threaded 12 mm diameter studs or approved stay collars are to be welded on to the posts to locate and secure the top ends of stays. Gate and corner posts shall each be fitted with one stay and straining posts fitted with two stays unless otherwise specified. Overhangs to tubular posts, where specified for security fencing, shall extend 350 mm on plan from the centre line of the post at an angle of 45° The overhang shall be formed of the same diameter mild steel tube as the post, mitre cut and welded on. The end of the mild steel tubular overhang shall be capped as previously described for posts.

Precast prestressed concrete posts and stays shall have a minimum 28 day compressive strength of 35 MPa. Aggregates used in the concrete mix shall comply with SABS Specification 1083 and cement shall comply with SABS Specifications 471, 626 and 831. The coarse aggregate shall be 13,2 mm stone. Posts and stays shall be mechanically vibrated in steel moulds and uniformly stressed by means of four 5 mm stressing wires complying with BS 5896 and having a concrete cover of 20 mm with a tolerance of 3 mm, to give a final compression of between 5,5 MPa and 6,9 MPa. The initial prestressing force shall not be higher than 70 % of the ultimate tensile strength of the wire. The prestressing force shall not be transferred to the concrete until the latter has attained 75 % of its 28 day compressive strength. Curing of concrete must be for a minimum period of 7 days using an approved method as laid down in SABS Specification 1200G. Where the ends of the prestressing wires are exposed the face of the concrete shall be cut back, immediately on removal from the mould, to expose the prestressing wires and the ends of the wires cut back and the recesses filled with 1:3 cement grout.

The resistance to loading on precast prestressed concrete posts and stays shall be as laid down in CKS 451 and posts and stays shall be capable of withstanding, without signs of cracking, a bending moment acting in either axial plane of at least 1 500 Nm for straining, corner and gate posts, 700 Nm for intermediate posts and 450 Nm for stays.

Precast prestressed straining and gate posts shall be 100 x 100 mm in section and intermediate standards and stays 75 x 75 mm in section, each of the length specified. Top ends of stays shall be splayed and bonded to posts with an approved epoxy adhesive.

Where overhangs to the precast prestressed concrete posts are specified for security fencing they shall extend 350 mm on plan from the centre line of the post at an angle of 45° and shall be of the same dimensions as the post. Sufficient prestressing wire shall be provided beyond the prestressing point to reinforce the full length of the overhang which shall be cast at a later stage using the same methods and materials as for the post without prestressing.

The finish of the precast prestressed concrete posts, stays and overhangs shall be such that, upon removal from the moulds, no further treatment shall be necessary to provide a straight, smooth and uniform finish, free from all honeycombing, holes, pinnacles and blemishes and equal to that normally obtained from properly manufactured steel moulds.

Concrete bases for posts and standards other than Y-section steel standards shall be Class B (1:3:5-19 mm stone) size 400 x 400 x 500 mm deep, unless otherwise specified, with tops of bases 100 mm below ground level.

FENCING

1,20m High four strand wire fencing with mild steel posts

Fencing shall be formed of four straining wires of the type specified, spaced 400 mm apart, with galvanised mild steel Y-section fencing standards, each 1,80 m long with a mass of not less than 4,54kg, driven 520 mm deep into the ground at 3,00 m centres between straining posts and with two galvanised mild steel ridgeback droppers, each 1,20 m long with a mass of not less than 0,68kg, to each bay between standards or standards and posts. The straining wires shall be tied at every intersection with standards and droppers with binding wire.

Galvanised mild steel straining and gate posts shall be 76 mm diameter x 3 mm wall thickness mild steel tube, each 1,80 m long, with domed cap at top and 150 X 150 x 5 mm thick mild steel base plate welded on at bottom. Stays shall be 51mm diameter x 2 mm wall thickness mild steel tube, each 1,70 m long overall, with flattened top end and 150 x 150 x 5 mm thick mild steel base plate welded on at bottom.

1,20 m High four strand wire fencing with precast concrete posts

Fencing shall be formed of four straining wires of the type specified, spaced 400 mm apart, with precast prestressed concrete standards erected between the straining posts and two galvanised mild steel ridgeback droppers, each 1,20 m long with a mass of not less than 0,68kg, to each bay between standards or standards and posts. The straining wires shall be tied at every intersection with standards and droppers with binding wire.

Precast concrete straining and gate posts shall be 1,80 m long, intermediate standards 1,80 m long, and stays 1,60 m long.

1,20 m High chain link wire mesh fencing

Fencing shall be as before described for four strand fencing with mild steel or precast concrete posts, as specified, but without mild steel droppers and with 1,20m high chain link wire mesh fencing, of the type specified, tied to straining wires and laced to posts.

1,50 m High chain link wire mesh fencing with mild steel posts or precast concrete posts

Fencing shall be formed of four straining wires of the type specified spaced 400 mm apart, and two rows of galvanised barbed wire spaced 150 mm apart and above the top straining wire. The straining wires and barbed wire shall be tied at every intersection with the intermediate standards. Two barbed wire braces are to be wired on to the two rows of barbed wire and top straining wire in each bay between standards or standards and posts.

Chain link wire mesh fencing 1,20m high, of the type specified, shall be tied to the straining wires and laced to posts.

Galvanised mild steel straining and gate posts shall be 76 mm diameter x 3 mm wall thickness mild steel tube, each 2,10m long with domed cap at top and 150 x 150 x 5 mm thick mild steel base plate welded on at bottom.

Intermediate standards shall be 51 mm diameter x 2 mm wall thickness mild steel tube, each 2,10 m long with flat cap at top and 150 x 150 x 5 mm thick mild steel base plate welded on at bottom. Stays shall be 51mm diameter x 2 mm wall thickness mild steel tube, each 1,93m long overall, with flattened top end and 150 x 150 x 5 mm thick mild steel base plate welded on at bottom.

Precast concrete straining and gateposts shall be 2,10 m long, intermediate standards 2,10 m long and stays 1,83 m long.

3,00 m High chain link wire mesh fencing with mild steel or precast concrete posts

Fencing shall be formed of seven straining wires of the type specified, spaced 500 mm apart, and tied at every intersection with the intermediate standards.

Chain link wire mesh fencing 3,00 m high, of the type specified, shall be tied to the straining wires and laced to posts.

Galvanised mild steel gate and straining posts shall be 102 mm diameter x 2,8 mm wall thickness mild steel tube each 3,60 m long with domed cap at top and 200 x 200 x 5 mm thick mild steel base plate welded on at bottom. Intermediate standards shall be 60 mm diameter x 2,8 mm wall thickness mild steel tube, each 3,60m long, with domed cap at top and 150 x 150 x 5 mm thick mild steel base plate welded on at bottom. Stays shall be 60 mm diameter x 2 mm wall thickness mild steel tube, each 3,60 m long overall, with flattened top end and 150 x 150 x 5 mm thick mild steel base plate welded on at bottom.

Precast concrete gate and straining posts, intermediate standards and stays shall be 3,60m long.

SECURITY FENCING

1,80m High chain link wire mesh security with mild steel posts or precast concrete posts and overhang Fencing shall be formed of five straining wires of the type specified, spaced 450 mm apart, with

overhang comprising three rows of galvanised barbed wire spaced 150 mm apart. The straining wires and barbed wire shall be tied at every intersection with the intermediate standards. Two barbed wire braces are to be wired on the three rows of barbed wire and top straining wire in each bay between standards or standards and posts.

Chain link wire mesh fencing 1,80m high of the type specified shall be tied to the straining wires and laced to posts.

Galvanised mild steel gate posts and cranked straining posts shall be 102 mm diameter x 2,8 mm wall thickness mild steel tube, each 2,80m long overall, with domed cap at top and 200 x 200 x 5 mm thick mild steel base plate welded on at bottom. Cranked intermediate standards shall be 51 mm diameter x 2 mm wall thickness mild steel tube, each 2,80 m long overall with flat cap at top and 150 x 150 X

5mm thick mild steel base plate welded on at bottom. Stays shall be 60 mm diameter x 2mm wall thickness mild steel tube, each 2,60m long overall, with flattened top end and 150 x 150 x 5mm thick mild steel base plate welded on at bottom.

Precast concrete gate and cranked straining posts shall be 2,80 m long, cranked intermediate standards 2,80 m long and stays 2,50 m long.

2,40 m High chain link wire mesh security fencing with mild steel posts or precast concrete posts and overhang

Fencing shall be formed of seven straining wires of the type specified, spaced 400 mm apart, with overhang comprising three rows of galvanised barbed wire spaced 150 mm apart. The straining wires and barbed wire shall be tied at every intersection with the intermediate standards. Two barbed wire braces are to be wired on to the three rows of barbed wire and top straining wire in each bay between standards or standards and posts.

Chain link wire mesh fencing 2,40 m high of the type specified shall be tied to the straining wires and laced to

posts.

Galvanised mild steel gate posts and cranked straining posts shall be 102 mm diameter x 2,8 mm wall thickness mild steel tube, each 3,40 m long overall, with domed cap at top and 200 x 200 x 5 mm thick mild steel base plate welded on at bottom. Cranked intermediate standards shall be 51 mm diameter x 2 mm wall thickness mild steel tube, each 3,40 m long overall, with flat cap at top and 150 x 150 X 5 mm thick mild steel base plate welded on at bottom. Stays shall be 60 mm diameter x 2 mm wall thickness mild steel tube, each 3,40m long, with flattened top end and 150 x 150 x 5 mm thick mild steel base plate welded on at bottom.

Precast concrete gate and cranked straining posts, cranked intermediate standards and stays shall be 3,40 m long overall.

GATES: -

Generally single gates and double gates shall be of the sizes stated and formed with mild steel tubular framing all round, covered with chain link wire mesh of the type specified laced to framing. Tubular framing to gates shall be mitred and welded at corners and at all other intersections, the tubular framing shall be scribed and welded together with all welds ground smooth.

Gates shall be hung on 20 mm diameter adjustable eye bolt hinges wrapped around gate framing with collar welded on to gate framing above eye bolt hinge. Each hinge shall be fitted with two nuts and two washers.

Where gates are to be hung on precast concrete posts, hinges shall be fixed to and including mild steel clamps, each formed of two 50 x 5 mm mild steel plates 200 mm long twice holed for and bolted on opposite sides of post with two 10 mm diameter x 140 mm mild steel hex-head bolts and with each plate holed to receive 20 mm diameter gate hinge.

Each single gate and one leaf of each double gate shall be fitted with gate latch formed of 25 x 6mm mild steel bracket, 550 mm girth, twice bent to U-shape with centre section 150mm high and with ends scribed and welded to tubular stile of gate. A locking bar formed of 25 x 6 mm mild steel plate, 100 mm long, twice holed 13 mm diameter for shackle of padlock and for padbolt, shall be welded to inside of bracket. The sliding padbolt shall be formed of 12 mm diameter mild steel rod, 220mm long, with 25 x 6mm mild steel flat bar 60mm long welded on at one end and holed 13 mm diameter for shackle of padlock. The stile of the gate and the locking post or locking stile of the double gate shall be holed for and fitted with mild steel ferrule welded in to receive padbolt. In addition, fittings to each leaf of double gate shall comprise 50 x 6mm mild steel locking bar, 80mm long, holed 20mm diameter for shackle of padlock and welded to locking stile of gate and dropbolt formed of 16mm diameter mild steel rod, 575 mm girth, once bent to L-shape, fitted through and including 20mm internal diameter mild steel sleeve welded to gate at bottom corner, with 12 mm diameter mild steel peg stay 25 mm long welded on to gate frame.

A concrete gate stop block size 230 x 230 x 230 mm deep with two 20 mm internal diameter mild steel sockets, each 75 mm long, cast into top shall be embedded in the road surface between each pair of double gates in the closed position. A similar gate stop block but with one socket shall be embedded in the road surface to each leaf of double gate in the open position.

Each single or double gate shall be fitted with an approved 51 mm brass padlock with hard steel shackle and two keys.

Gates for 1,20 m high fencing

Single gates shall be size 1,00 x 1,20m high, each hung on one pair of hinges and formed of 32 mm diameter x 2 mm wall thickness mild steel tubular framing all round. Each gate shall be fitted with locking padbolt with brass padlock.

Double gates shall be in two equal leaves with each leaf size 2,25 x 1,20 m high, hung on one pair

of hinges and formed of 38 mm diameter x 2 mm wall thickness mild steel tubular framing all round with two 38 mm diameter x 2 mm wall thickness mild steel tubular braces welded on between bottom corners and centre of top rail of each leaf. Each pair of double gates shall be fitted with locking pad-bolt, locking bars with brass padlock, drop bolts and concrete gate stop blocks.

Gates for 1,50 m high fencing

Single gates shall be size 1,00 x 1,20 m high as described for gates for 1,20 m high fencing but with each stile of gate extended 330 mm above top rail and braced between top rail and top of extension arm with 32 mm diameter x 2 mm wall thickness mild steel diagonal brace welded on. Two rows of galvanised barbed wire, spaced 150 mm apart, shall be strained and tied to the extension arms.

Double gates shall be in two equal leaves with each leaf size 2,25 x 1,20 m high all as described for double gates for 1,20 m high fencing but with each stile of each leaf extended 330 mm above top rail and braced between top rail and top of extension arm with 38 mm diameter x 2 mm wall thickness mild steel diagonal brace welded on. A vertical extension arm 330 mm high, formed of 38 mm diameter x 2 mm wall thickness mild steel tube shall be welded on above centre of top rail. Two rows of galvanised barbed wire, spaced 150 mm apart, shall be strained and tied to extension arms.

Gates for 3,00 m high fencing

Single gates shall be size 1,00 x 2,00 m high, each hung on one pair of hinges and formed of 38 mm diameter x 2 mm wall thickness mild steel tubular framing all round with 38 mm diameter x 2 mm wall thickness mild steel horizontal centre rail. Each gate shall be fitted with locking padbolt with brass padlock.

Chain link wire mesh fencing shall be carried over above the top of the gate as previously described for fencing.

Double gates shall be in two equal leaves with each leaf size 2,25 x 3,00m high, hung on one and a half pairs of hinges and formed of 51 mm diameter x 2 mm wall thickness mild steel tubular framing all round with two 51 mm diameter x 2 mm wall thickness mild steel tubular braces welded on between bottom corners and centre of top rail of each leaf. Each pair of double gates shall be fitted with locking padbolt, locking bars with brass padlock, drop bolts and gate stop blocks.

Gates for 1,80m high security fencing

Single gates shall be size 1,00 x 1,80m high, each hung on one pair of hinges and formed of 38 mm diameter x 2 mm wall thickness mild steel tubular framing all round with 38 mm diameter x 2 mm wall thickness mild steel horizontal centre rail. Each gate shall be fitted with locking padbolt with brass padlock.

Single gates shall be hung on mild steel tubular gate posts with cranked overhang and the galvanised barbed wire overhang shall be carried over above the gate as previously described.

Double gates shall be in two equal leaves with each leaf size 2,25 x 1,80m high, hung on one and a half pairs of hinges and formed of 51 mm diameter x 2 mm wall thickness mild steel tubular framing all round with two 51 mm diameter x 2 mm wall thickness mild steel tubular braces welded on between bottom corners and centre of top rail of each leaf. The stiles of each gate shall be extended 450 mm high above the top rail and braced between top rail and top of extension arm with 51 mm diameter x 2 mm wall thickness mild steel diagonal brace welded on. A vertical extension arm 450 mm high formed of 51 mm diameter x 2 mm wall thickness mild steel tube shall be welded on above centre of top rail. Three rows of galvanised barbed wire, spaced 150 mm apart, shall be strained and tied to extension arm. Each pair of double gates shall be fitted with locking padbolt, locking bars with brass padlock, drop bolts and gate stop blocks.

Double gates shall be hung on posts without cranked overhang but with the posts extended 450 mm high above top of chain link wire mesh fencing to receive ends of barbed wire overhang.

Gates for 2,40 m high security fencing

Single gates shall be size 1,00 x 2,00 m high, all as described for gates for 1,80 m high security fencing.

Chain link wire mesh fencing shall be carried over above the top of the gate to an overall height of 2,40m with the barbed wire overhang carried across between the gate posts.

Double gates shall be in two equal leaves, with each leaf 2,25 x 2,40 m high, all as described for double gates in 1,80 m high security fencing.

Double gates shall be hung on posts without cranked overhang but with the posts extended 450 mm high above top of chain link wire mesh fencing to receive ends of barbed wire overhang.

PRECAST CONCRETE FENCING

Precast concrete fencing shall comply with the requirements of SABS Specification 1372. Precast concrete fencing components shall have a minimum 28 day compressive strength of 30MPa.

Aggregates used in the concrete mix shall comply with SABS Specification 1083 and cement shall comply with SABS Specifications 417, 626 and 831. The coarse aggregate shall be 13,2 mm stone.

Posts and panels shall be mechanically vibrated in steel moulds and reinforced as specified. The curing of the concrete must be for a minimum period of 7 days using an approved method as laid down in SABS Specification 1200G.

The finish of the precast concrete fencing components shall be such that, upon removal from the moulds, no further treatment shall be necessary to provide a straight, smooth and uniform finish free from all honeycombing, holes, pinnacles and blemishes and equal to that normally obtained from properly manufactured steel moulds.

Where overhangs to the precast concrete fencing are specified they shall extend 350 mm on plan from the centre line of the post at an angle of 45 degrees and shall be cast on at a later stage with a 10 mm diameter deformed reinforcing bar bent as required and cast into top of post. The overhang shall comprise three rows of galvanised barbed wire spaced 150 mm apart, strained and tied to overhang on each post through holes formed in the precast concrete overhang.

At any change in direction of the fence line two precast concrete posts shall be erected with bottom ends embedded in a common concrete base.

Concrete bases for precast concrete posts shall be Class B (1:3:5- 19 mm stone) size 400 x 400 x 600 mm deep, unless otherwise specified, with tops of bases 100 mm below ground level.

Precast concrete post and panel fencing shall be of the height specified and shall comprise 125 >< 135 mm precast concrete posts, reinforced with eight 4,5 mm galvanised high tensile steel wires, erected at 1 570 mm centres with precast concrete panels fitted into vertical grooves in concrete posts and grouted up solid in 1:3 cement mortar.

Precast concrete panels shall each be 1 440 mm long, 300 mm high and maximum 65 mm thickness at bottom edge tapering to 55 mm at top edge and reinforced with "Reference 193" welded mesh reinforcement mat. The bottom panel shall in each case be levelled and supported at each end on a brick embedded in top of the concrete base to the post and protruding 100 mm above base.

Precast prestressed concrete post and pale fencing shall be of the height specified and shall comprise precast concrete posts erected at 2 m centres, each twice slotted for and including two horizontal precast concrete rails and nine precast concrete pales spaced equidistantly between posts, bolted through preformed holes to rails with and including 8 mm diameter galvanised mild steel bolts 140 mm long with nut and washer and with bitumastic felt or PVC washer fitted between pale and rail.

Precast prestressed concrete components of post and pale fencing shall be manufactured as previously specified for "precast prestressed concrete posts and stays" unless otherwise described. Precast concrete posts shall be 3000 mm long, 225 mm thick and 140 mm wide at back, tapering on both sides to 80 mm wide at front edge, with both front edges rounded, and reinforced with six 5 mm stressing wires. Each post shall be twice slotted 95 mm wide and 165 mm high for horizontal rails with top end of each post twice splayed. Precast concrete horizontal rails shall be 1980 mm long, 80 mm wide and 150 mm high, reinforced with four 5 mm stressing wires and each nine times holed for bolts with recesses for nuts formed in back of rails. The ends of the rails shall be grouted up solid in 1:3 cement grout in the slots formed in the posts and the recesses in the backs of the horizontal rails shall be similarly grouted up only on completion of the fencing.

Precast concrete pales shall be 2370 mm long, 75 mm thick and 100 mm wide at back, tapering on both sides to 80 mm wide at front edge, with both front edges rounded and reinforced with four 5 mm stressing wires. The pales shall each be twice holed for bolts with recesses formed in face for head of bolt. The top and bottom ends of each pale shall be twice splayed.

Precast concrete blanking plates shall be 1 700 mm long, 40 mm wide and 300 mm high reinforced with two 5 mm stressing wires. Blanking plates are to be embedded in ground with the top of the blanking plate 100 mm below ground level and with the ends of the blanking plate embedded in the side of the concrete base to the precast concrete post.

Where overhangs to the precast concrete post and pale fencing are specified they shall be formed on the pale, extended 350 mm on plan from the centre line of the pale at an angle of 45 degrees and be of the same dimensions as the pale. Sufficient prestressing wire shall be provided beyond the prestressing point to reinforce the full length of the overhang which shall be cast at a later stage.

PAINTING OF POSTS, GATES, ETC.: -

Where gate posts, straining posts, intermediate posts, stays, standards, and gate framing are described as galvanised and used in conjunction with Type I chain link wire mesh fencing they shall be painted, before erection, with two coats of approved bituminous aluminium paint. Where these items are used in conjunction with Type 2PVCcoated chain link wire mesh fencing or precast concrete fencing they shall be painted, before erection, with one coat of calcium plumbate primer as SABS Specification 912, one undercoat as SABS Specification 681 Type II, and two finishing coats of high gloss enamel as SABS Specification 630 Type I. After erection, any bared or damaged surfaces are to be made good to approval.

RATES FOR FENCING, ETC.:-

Rates for fencing shall include for clearing all fence lines, excavating in all types of materials for fence lines, concrete bases, blanking plates, etc., and any formwork necessary to concrete bases. Rates for gate posts, straining posts, intermediate posts, stays, standards, etc., are to include for embedding ends in and including concrete bases and for painting as specified. Rates for gates are to include for setting up in position and hanging and for painting tubular framing as specified.

SUBMISSIONS FOR PREFABRICATED TIMBER ROOF TRUSSES

Letter Ref. TR1

I (We) hereby undertake to be responsible for the design of the total timber roof construction and will satisfy myself (ourselves) that the fabrication and erection is in accordance with my (our) design.
Project:

Part(s):

NAME OF FIRM:
SIGNATURE:

QUALIFICATION:

DATE:

Letter Ref. TR2

I (We) am/are satisfied that the fabrication and erection of the total roof construction has been completed in conformity with my (our) design.

Project:

Part(s):

NAME OF FIRM

SIGNATURE:

QUALIFICATION:

DATE:

HEAVY DUTY ROADWORK

The contractor is referred to the preambles for "Earthworks" with particular reference to the full description, intent and meaning of the classification for excavations and the preambles for "Concrete, Formwork and Reinforcement".

The contractor shall carry out the necessary tests to confirm that all materials use in the construction of roadworks comply with the relative material requirements listed hereunder.

The results of all material tests shall be submitted to the Director for acceptance, together with duplicate samples for check testing when required.

EARTHWORKS

Fill Materials Below Subgrade:-

Material used in the construction of the various embankment layers shall be as provided for hereunder, unless otherwise required by the Director.

Depth Below Finished Road Level	Minimum C.B.R. at 90% MAASHTO density.
0 mm - 300 mm (or as otherwise specified)	Pavement layers (see sections 2.3.0 and 2.4.0)
300 mm - 500 mm (or as otherwise specified)	Selected Subgrade (Section 2.2.3)
500 mm - 1 metre (or as otherwise specified)	3 (max swell 1,5 %)
Over 1 metre	As required by Engineer (max swell 4,0%)

Where rock occurs in the road prism selection shall be exercised to provide for the placing of excavated rock in the base of embankments, unless otherwise required by the Director.

For fill material 1 metre below grade the minimum density in place as a percentage of the MAASHTO density at optimum moisture content shall be 90 %. This criterion shall be deemed to have been complied with provided at least 75 % of the test results on a section, submitted for acceptance control, exceeds 90 % of MAASHTO density and no single result falls below 85 % of MAASHTO density.

Subsoil Drainage Filter Criteria:-

The material used as filter media shall satisfy the following criteria:

- (a) The 15 % Passing Size of the filter material divided by the 15 % Passing Size for the fill material shall be greater than or equal to 5 for permeability..
- (b) The 15 % Passing Size of the filter material divided by 85 % Passing Size of the fill material shall be less than or equal to 5 to prevent clogging.

Graded filters at the two embankments shall comprise several layers of filter material each of which satisfies the above criteria.

If filter fabric is used, filter media shall be any approved concrete sand.

SUBGRADE

Selected Subgrade (denoted by codes G5, G6, G7, G8 and G9)

(a) Minimum CBR at 93 % MAASHTO density; G5 = 30; G6 = 25; G7 = 15; G8 = 10; G9 = 7. In the case of G5, a CBR of 45 at 95 % MAASHTO density is also required. If selected subgrade is stabilised the minimum CBR at 93 % compaction after stabilisation = 30.

(b) Maximum CBR swell G5= 0,5 %; G6= 1,0 %; G7, G8, G9+ 1,5 % at 100 % MAASHTO density.

(c) Maximum Plasticity Index: G5 = 10; G6, G7, G8, G9 = 12, Except in the case of G5 material, the Director may approve higher PI based on formula:
Max. PI = 3.GM + 10 where PI = Plasticity

Index, GM = Grading Modules =
$$\frac{P2 + P425 + P75}{100}$$
 where

P2, P425 and P75 are percentages retained on 2,0, 0,425 and 0,075 mm sieves respectively.

(d) Maximum particles size in place: G5 and G6, 63 mm or 2,3rd-layer thickness, whichever is smaller. G7, G8, G9, 2/3rd layer thickness.

(e) Grading Modulus: (Minimum) G5 = 1,5, G6 = 1,2, G7 = 0,75.

(f) The minimum density in place as a percentage of the MAASHTO density at optimum moisture content shall be 93 %. For cohesionless sands the minimum compaction shall be 100 % of MAASHTO density.

The criterion shall be deemed to have been complied with provided at least 75 % of test results on a section, submitted for acceptance control, exceeds 93 % of MAASHTO density and no single result falls below 88 % of MAASHTO density.

(g) The layer thickness shall not be less than 90% of the specified thickness at any one point, and the mean of 15 values on a section shall not be less than the specified thickness.

Lower Subgrade (denoted by code G10): -

In the lower subgrade (600 mm - 1000 mm below grade or as otherwise specified)

the material shall have a minimum CBR of 3 at 90 % MAASHTO density and a maximum swell of 1,5 %.

STABILISED SUBBASE

The subbase material shall comprise of two standards denoted by the code C3 and C4 and shall comply after compaction and stabilisation with the following requirements (a) to (m).

(a) Lime shall comply with SABS 824 and cement shall comply with SABS 471 or SABS 626.

(b) Minimum CBR at 95 % MAASHTO density } C3 = 80
(Provided that the minimum CBR, before } C4 = 50
stabilising, at 95 % MAASHTO density, = 20 }

(c) Maximum CBR swell after stabilisation = 1.0%

(d) The minimum UCS at 100% MAASHTO compaction } C3 = 1,5 MPa
cured for 24 hours at 75 degrees centigrade } C4 = 0,75 MPa
and soaked for 4 hours (for lime) or after }
7 days curing at 25 degrees centigrade and 4 }
hours soaking at 100 % MAASHTO compaction }
(for cement)

(e) Maximum Plasticity Index after stabilisation = 6

(f) Maximum Size of Particle = 2/3rd of layer thickness or 63 mm whichever is smaller.

(g) Maximum percentage passing No.75 micron sieve (before stabilisation) = 25

- (h) Grading of Modulus (before stabilisation) = 1,5
- (i) The minimum density in place as a percentage of MAASHTO density at optimum moisture content shall be 95 %. This criterion shall be deemed to have been complied with provided at least 75 % of the test results on a section, submitted for acceptance control, exceeds 95 % of MAASHTO density and no single test result falls below 91 % of MAASHTO density.
- (j) The moisture content used for field compaction shall not exceed the MAASHTO optimum plus 2,0 %.
- (k) The stabiliser content of a section shall be such that 90 % of the samples tested exceed 60 % of the nominal content specified and the coefficient of variation does not exceed 25 % consecutive samples tested.
- (l) The pH after stabilisation should be 11 min, unless the lime content is proved to be adequate by the I.C.L test.
- (m) The layer thickness shall not be less than 90 % of the specified thickness at any one point and the mean of 15 values on a section shall not be less than the specified thickness.

BASECOURSE

Stabilised Basecourse: -

(Lime or cement stabilised - denoted by Codes C1, C2 or C3)(derived from stabilising G3, G4, G5, G6 or G7 material).

Stabilised basecourse material shall comply after stabilisation and compaction with the following requirements: -

- (a) Lime shall comply with SABS 824 and cement shall comply with SABS 471 or SABS 626.
- (b) Minimum CBR at 98% MAASHTO density (Provided that }C1 N/A
the minimum CBR, before stabilising, }C2 = 150
at 95 % MAASHTO density, = 30) }C3 = 300
- (c) Maximum CBR swell after stabilisation = 0,5 %
- (d) The minimum UCS at 100 % MAASHTO compaction cured for 24 hours }C1=6,0MPa
at 75 degrees celcius and soaked for 4 hours (forlime) or after 7 days }C2 =
3,0MPa
curing compaction (for cement) }C3 =1,5MPa
- (e) Maximum Plasticity Index after stabilisation = 4.
- (f) Maximum Size of Particle = 2/3rds of layer thickness or 63 mm whichever is smaller.
- (g) Maximum percentage passing No.75 micron sieve (before stabilisation) = 25.
- (h) Grading Modulus (before stabilisation) = 1,75
- (i) The minimum density in place as a percentage of the MAASHTO density at optimum moisture content shall be 98 %. This criterion shall be deemed to have been complied with provided at least 75 % of the test results on a section, submitted for acceptance control, exceeds 98 % of MAASHTO density and no single result falls below 94 % MAASHTO density.
- (j) The moisture content used for field compaction shall not exceed the MAASHTO optimum plus 2 %.
- (k) The stabiliser content of a section shall be such that 90% of the samples tested exceed 60 % of the nominal content specified and the coefficient of variation does not exceed 25 % of 15 consecutive samples tested.
- (l) The pH after stabilisation should be a minimum of 11, unless the lime content is proved to be adequate by the I.C.L test.
- (m) The layer thickness shall not be less than 90 % of the specified thickness at any one point, and the mean

of 15 values on a section shall not be less than the specified thickness.

Crushed Rock Basecourse (denoted by Code G1 or G2)

NOTE: G2 differs from G1 in that G2 contains fines from other material than the parent rock.

Crushed rock shall comply with SABS 1083 in general and the following in particular:

- (a) Plasticity index (maximum) G1 4* } see note
G2 6* }

*NOTE: If percentage passing 0,075 sieve exceeds 9 % then G1 must be non plastic, and max. P1 of G2 = 4.

- (b) Maximum Flakiness Index of the - 26,5 mm + 13,2 mm material = 35 %
(c) Maximum Aggregate Crushing Value = 29%
(d) The crushed rock shall be sound, free from shale, weathered and decomposed rock, clay and other deleterious matter, and shall meet one of the following grading envelopes whichever is specified in the Project Specification. The grading shall follow a smooth curve parallel to the grading envelope and irregular ('armchair' or 'hump') grading will not be accepted.

Sieve Size (mm)	Percentage Passing (Mass)	
	37,5 mm Max. Size	26,5 Max. Size
37,5	100	100
26,5	84 -94	100
19,0	71-84	85-95
13,2	59-75	71-84
4,75	36-53	42-60
2,00	23-40	27-45
0,425	11-24	13-27
0,075	4-12	5-12

- (e) The minimum compacted density expressed as a % of solid or maximum theoretical density shall be 88 % except that where two base layers are constructed, the lower layer may be 86 %. These criteria shall be deemed to have been complied with provided at least 80 % of the test results on a section submitted acceptance control exceeds 88 % or 86% of solid density, as applicable and no single test result fall below 84 % for upper base, or 82% for lower base.
(f) Where fines from a source other than the parent rock are used in G2 material, such fines shall be approved by the Director, before blending.
(g) The layer thickness shall not be less than 90% of the specified thickness at any one point, and the mean of 15 values on a section shall not be less than the specified thickness.

*Lime or Cement Treated Crushed Rock Basecourse (denoted by Codes C1, C2 or C3) (Derived from stabilising G1 or G2 material):*All requirements for Crushed Rock Basecourse as set out above shall apply, except for Clause (e) therein. In addition, the following provisions of Clauses (a), (b), (e), (i), (j) and (k) of the previous section relating to Stabilised Basecourse shall apply.

Crushed Gravel or Lower Quality Stone Basecourse (denoted by G3 or G4): -

G3 and G4 materials may be used either stabilised or unstabilised. When stabilised with lime or cement the provisions of Clauses (a), (b), (c), (d), (e), (i), (j), (k), (l) and (m) of the section relating to Stabilised Basecourse shall apply. G3 and G4 materials wither laid unstabilised or before stabilising shall comply with the following requirements.

- (a) Grading: G3 material shall comply with Clause (d) of the section relating to Crushed Rock Basecourse.

G4 material shall comply with the following grading:

Sieve Size (mm)	Percentage Passing (Mass)
53,0	100
37,5	85-100
19,0	60-90
4,75	30-65
2,0	20-50
0,425	10-30
0,075	5-15

- (b) Maximum plasticity index shall be 6, maximum liquid limit 25 and maximum linear shrinkage 3 %.
- (c) Minimum CBR after soaking: 80 at 98 % MAASHTO, and maximum swell 0,2 % at 100 % MAASHTO.
- When G4 is used as unstabilised base the grading shall follow a smooth curve parallel to the grading envelope, and irregular ("armchair" or "hump") grading will not be accepted. Unstabilised G3 and G4 base shall be compacted as for G1 or G2 Crushed Rock Basecourse, and the provisions of Clauses (e), (f) and (g) shall apply, in respect of density, additional fines, and layer thickness.

BITUMEN OR TAR BOUND BASE COURSE/BITUMEN BOUND WEARING COURSE

Coarse aggregate:-

Shall be hard, durable and sound crushed unweathered rock free from deleterious material conforming to SABS 1083 in general and to the following requirements in particular when tested before mixing:

- (i) The aggregate crushing value shall not exceed 25 for wearing course and 29 for basecourse.
- (ii) The flakiness index shall not exceed 35.
- (iii) The maximum absorption of the aggregate shall be 1,0 % when tested in accordance with SABS test method 843.
- (iv) The grading of the aggregate shall comply with the following requirements before mixing:

Sieve Size (mm)	Percentage Passing Sieve (mm)			
	Nominal Aggregate Size (mm)			
	26,5	19,0	13,2	9,5
37.50	100			
26.50	85-100	100		
19.00	0-50	85-100	100	
13.20	0-25	0-50	85-100	100
9.50	0-5	0-25	0-55	85-100
6.70		0-5	0-25	0-55
4.75			0-10	0-25

Fine Aggregate.

- (i) Fine aggregate shall consist of a blend of crusher dust and clean, hard, non-plastic sand. Continuous and semi-gap graded mixes shall contain a minimum of 15 % of crusher dust, (expressed as a percentage of the total aggregate in the mix). The grading shall generally fall within the following limits when tested before mixing

Sieve Size (Microns)	Percentage Passing Sieve (mass)	
	Sand	Crusher Dust
9500	-	100
4750	-	90-100
2360	100	70-90
1180	90-100	40-70
600	80-100	30-50
300	60-80	20-40
150	30-50	10-25
75	8-20	8-16

- (ii) The mean Sand Equivalent of 5 random samples from the batch tested shall not be less than 35. If two or more sands are blended, the minimum sand equivalent of any one sand shall be 25.
- (iii) The maximum water absorption of the sand shall not exceed 0,5 % when tested in accordance with TMHI method BI5.

Filler:-

The filler shall consist of milled blast furnace slag, limestone dust, or cement in accordance with the requirements for filler material of BS 594 specification. The type of filler shall not be varied during the contract.

Combined Aggregate (Final) Grading:-

A grading of the combined aggregates, submitted by the Contractor, shall be approved by the Director prior to laying from the envelopes given below. During construction the material laid shall conform to the approved grading subject to the tolerances specified under heading Composition of Mix.

Sieve Size	Percentage Passing Sieve (Mass)						
	Base or Wearing Course				Wearing Course		Kerbs
	Semi Gap		Continuous		Gap	Continuous	
	26mm.	19mm	19mm	13mm	Low	High	
TS;BS; AS.	TS;BS; AS.	BC;TC	AC	Stone	Stone		
				AG(l)*	AG(h)*		
37,5	100						
26,5	90-100	100	100		100	100	
19,0	80-95	92-100	85-95	100	90-100	90-100	100
13,2	65-85	82-92	71-84	85-100	80-100	80-100	85-100
9,5	60-80	73-86	62-78	70-90	50-85	40-80	
4,75	45-60	45-60	42-60	50-70	50-60	35-50	65-80
2,36	40-52	40-52	30-48	35-50	50-60	35-50	50-65
1,18	36-47	36-47	22-38	25-40	50-60	35-50	
0,60	32-42	32-42	18-20	40-55	40-55	30-50	
0,30	24-34	24-34	12-20	12-20	20-45	20-45	18-30
0,15	10-20	10-20	8-15	8-15	10-30	10-30	
0,075	5-10	5-10	5-10	5-10	5-10	5-10	5-10

* Not more than 8 % of material shall pass the 4,75 mm sieve and be retained on the 1,18 mm sieve.

Binder: The Binder shall be 40/50 or 60/70 penetration bitumen conforming to the latest SABS 307 Specification or RTH 50/55 tar conforming to latest SABS 748 Specification.

COMPOSITION OF MIX: BITUMEN OR TAR BOUND BASECOURSE AND WEARING COURSE

Final Composition:

The final composition of the mixture laid on the road shall conform to the approved grading or to such amended aggregate or binder contents as may be ordered by the Director, subject to the following limits:

Material	Tolerance (% Mass of total mix)	
	75 % of all results	All results
Course Aggregate (% mix retained 2,36 mm Sieve)	plus/minus 4	plus/minus 6
Fine Aggregate (% Mass passing 2,36 mm retained)	plus/minus 4	plus/minus 6
Filler (% Mass material passing 0,075 mm Sieve)	plus/minus 1,5	plus/minus 2
Bitumen	plus/minus 0,3	plus/minus 0,5
Tar R.T.H. 50/55 + 11/2 % PVC	plus/minus 0,3	plus/minus 0,5

Any deficiency in filler content of the mix shall be made up with filler meeting the requirements of BS 594 specification.

Mix Proportions and Marshall Design Criteria

These shall fall within the following limits:

Property	Limits					
	Base or Wearing Course			Wearing Course	Kerbs	
	Gap	Semi-Ga	Continuous	Open	Continuous	
Binder Content (nominal %)						
bitumen	5,5-7,0	5,2-6,2	4,8-5,8	5,5-6,5		5,5-6,5
tar	-	6,5	6,0	-		-
Active filler (min%)	1	-	-	1		-
Stability at 60 degrees celcius (min kN)	5	5	5	3,5		3,5
Flow (mm 2-4)	2-4		2-4	-		2-4
Stability/Flow min kN/mm)	2,5	2,5	2-5	-		-
Air Voids (%)	3-7	3-7	3-7	15 min		3-7
Immersion Index (min %)	75	75	75	-		-

Compaction:-

The minimum density as a percentage of the theoretical maximum density = 92.

Temperature Controls/ degrees Celcius -

These shall be as follows: -

Type	Material and Construction Stage							
	Bituminous		Binders		Aggregates		Bituminous Mixes	
	In Storage		Immediately before mixing		Immediately before mixing		Continuous Open Graded or graded	
	min.	max.	min.	max.	min.	max.	min.	max.
Bitumen								except for drum mixed
40/50 pen.	145	195	150	180))	
60/70	135	185	140	170))	
80/100	125	175	130	160	)	120 160	)	120 160 110 130
150/200	115	165	120	150))	
Road Tars								
RTH45/50	95	110	90	110	)	80 115	)	80 115 -
50/55	10	110	90	110				

Variations:- The Contractors attention is drawn to the right of the Director to amend the specification in any respect, subject to the provisions for adjusted measurement and payment.

PRECOATED AGGREGATE SURFACING

Aggregate:-

The aggregate shall be hard, durable and sound crushed unweathered rock, free from deleterious material, conforming to SABS 1083 in general. The nominal size shall be 19 mm or 16 mm and comply with the following requirements when tested before coating:-

- (a) The aggregate crushing value shall not exceed 21 % when tested in accordance with TMH 1 Method B1.
- (b) The flakiness index shall not exceed 20 (the shape of the individual aggregate shall be as near cubical as possible).
- (c) Grading requirements of chips shall be as follows:-

Sieve Size (mm)	Percentage Passing Sieve by Mass		
	19mm	16mm	13mm

26,5	100		
19,0	85-100	100	
16,0	-	85-100	100
13,2	0-30	0-60	85-100
9,5	0-5	0-5	0-30
4,5	-	-	0-5

(d) The PSV (polished stone value - SABS 848) shall not be less than 50.

Precoating: The aggregate shall be precoated using approximately 1 % by mass of the binder used in the wearing course. During wet weather, stockpiles must be covered with tarpaulins or similar protective coverings.

SURFACE TREATMENTS

Aggregates:-

The aggregates shall be hard, durable and sound, crushed unweathered rock, free from deleterious material, conforming to SABS 1083 in general and the following in particular: -

- (a) The Aggregate Crushing Value shall not exceed 21.
- (b) Grading and flakiness requirements shall be as follows: -

Sieve Size	Percentage Passing Sieve by Mass Nominal Aggregate Size (mm)				
	19	16	13,2	9,5	6,7
26,5	100				
19,5	85-100	100	100		
16,5		85-100			
13,2	0-30	0-60	85-100	100	
9,5	0-5	0-5	0-30	85-100	100
6,7			0-5	0-30	85-100
4,75				0-5	0-30
3,75					0-5
Flakiness					
Index	ma 25	25	25	35	N.A.

- (c) The percentage fines passing the 0,075 mm sieve shall be less than 0,5.
- (d) The P.S.V. (polished stone value - SABS 848) shall not be less than 50.

KERBS

Generally

The kerbs are to be laid before the base course is commenced to the lines and positions as shown on the drawing. The Contractor is to allow sufficient time for the mortar bedding and joints to set and is to take all necessary precautions to maintain the line of the kerbs especially while rolling the base course and surfacing, as no claims in this connection will be considered.

Rates for kerbs are to include for necessary excavation, well consolidating bottom under kerbs and for filling and ramming to secure the kerbs in position.

Precast Concrete Kerbs

Precast concrete kerbs are to be of concrete Class 20 (20 MPa) and of the sizes described in the items, cast generally in 1 m lengths, and finished smooth off the mould on top edge and both sides, with angles rounded, and rates are to include for all necessary formwork and moulds. The kerbs are to be bedded on and including a mat of 1:3 cement mortar, and the abutting ends of the kerbs are to be fully jointed in a similar mortar and pointed with a keyed-in joint on top edge and exposed sides.

SUPPLEMENTARY PREAMBLES

The following Supplementary Preambles are to be read in conjunction with the "Standard Preambles to all Trades WB20 – 1986" included here before and are to apply to this Contract. Where these "Supplementary Preambles" are at variance with the "Standard Preambles to all Trades" referred to above, such variances are to take precedence and are to apply to this Contract.

-----oOo-----

ALTERATIONS

All Notes, Preambles, etc. applicable for the various trades in the Bills of Quantities, will apply equally to the trades in this Bill.

Tenderers are advised to visit the site and satisfy themselves as to the nature and extent of the work to be done, and also to examine the condition of the existing buildings.

Tenderers are advised that all materials from pulling down (except where described to be re-used or handed over to the Director) will become the property of the Contractor, and all these materials, together with all rubbish and debris, must be immediately carted away, and the site left clean and unencumbered. Materials, etc. which are described to be handed over to Employer are to be carefully dismantled where necessary, and neatly stacked where directed on site. Items described as "removed" shall be removed from site.

Credit for the value of the materials from the pulling down may be allowed for on the final Summary page.

Prior to the removal of any timbers from the site, they are to be inspected by the government Entomologist as laid down in Section 32 of the Government Forest and Veld Conservation Act of 1941 (Act 13 of 1941) as amended. If any of the timbers are infested with wood destroying agencies, they are to be disposed of in the manner prescribed by the Government Entomologist.

The Contractor is to give ample notice to the Employer and Local Authorities regarding any disconnections necessary prior to the removal or interruption of electric light or telephone cables, water and sanitary services, etc.

Tenderers are advised that when sections of the buildings are to be occupied during the building operations, and the Contractor is required to carry out the work with as little noise, dust and disturbance as possible. Undisturbed access is to be given to patients, staff and visitors.

The Contractor is advised to check all dimensions affecting the existing building, as he will be held solely responsible for all new work being of the correct size. All sizes stated are approximate and under no circumstances will claims be entertained should actual sizes of existing items on site vary marginally from the sizes stated in this document.

The Contractor will be held solely responsible for any damage to persons, property, and equipment and for the safety of the structure throughout the whole of the Contract, and must make good at his own expense any damage that may occur.

The Contractor must obey the instructions of the Employer in carrying out any portion of the work which in his opinion requires expediting, and the Contractor shall give priority to such work as and when directed.

In taking down and removing existing work, the utmost care is to be observed to avoid any structural or other damage to the remaining portions of the building. The Contractor must also protect all work not removed, such as walls, floors, doors, windows or joinery, loose and fixed fittings and electrical equipment, appliances, etc. from damage during the progress on the works and provide all necessary materials in so doing.

Special care is to be taken not to interfere with any electric light, bell, power or telephone wires and fittings that may be encountered on site. New work to the existing electrical, air-conditioning, gas and telephone installations, etc. is included elsewhere in this document.

The Contractor must take the exigencies of the User/Client Service into consideration. Liaison is to be carried out through the offices of the Head: Works, with referrals to the Regional Director for a final decision.

No instructions may be received by the Contractor from the User/Client Authorities and all instructions are to be given by the Head: Works or his Representative in writing before they are put in hand.

CONCRETE, FORMWORK AND REINFORCEMENT

Cement is to comply with:

SABS ENV 197 (1 to 2)
SABS ENV 413 (1 to 2)
SABS ENV 196 (1 to 7)
SABS ENV 196 (21)

As applicable, and replaces the following SABS Specifications in the Standard Preambles:

SABS 471 Portland Cement (ordinary, rapid hardening and sulphate resisting)
SABS 626 Portland Blast Furnace Cement
SABS 831 Portland Cement 15 (ordinary and rapid hardening)

MASONRY

Masonry is to comply with **SABS Code of Practice 0249** and **0164** as applicable.

ROOF COVERINGS, ETC.

The installation of roof coverings and side cladding is to comply with **SABS Code of Practice 0237** as applicable.

CARPENTRY AND JOINERY

Note:

All timber must be treated in terms of **SABS Code of Practice 05** for GYMNOSPERMAE including all SA Pine species and ANGIOSPERMAE including all Eucalyptus species but excluding laminated timber. It is now a compulsory requirement to use only treated timber in buildings. The treatment shall comply with **SABS 457, 753, 754** or **1288**.

Reference must also be made to the appropriate Standard Preambles and SABS requirements for items not covered by these joinery preambles, etc. i.e. ironmongery, aluminium, glazing, paintwork, etc.

Where items are described as "plugged and screwed", they are to include for plugging and screwing to new or existing brickwork or concrete, with heads of screws sunk and pelleted.

Sawn softwood timber: General, Stress Graded, Industrial, Brandering and Battens is to comply with **SABS 1783 Parts 1 to 4** as applicable.

All hardwood is to be dark red meranti, even in grain and colour, selected for "Standard and Better" quality, from Malaysia, with a minimum density of 550 kg per cubic metre at a moisture content of 12%, and is to comply with **SABS 1099** as applicable.

Hardwood is, unless otherwise described, to be 3 mm untempered hardboard for floor units and 6 mm tempered hardboard for wall units.

Chipboard is, unless otherwise described, to be 16 mm thick.

Melamine faced chipboard is to be 16 mm thick with a white melamine impregnated finish on both sides.

Melamine faced chipboard in adjustable shelving is to be of the width as described with white plastic pre-glued edge strips or fixed with contact adhesive, or similar, to both edges and ends of the shelves. The number of shelves is stated in descriptions.

Materials generally are to comply with the following specifications and requirements as applicable:

Material	SABS Specification	Grade or Class
Softwood structural timber	1783)	Parts 1, 2, 3, 4
Softwood engineering timber	1783)	
Softwood studs for timber frames in building	1783)	
Softwood brandering and battens	1783)	
Softwood joinery timber	1783)	
Softwood flooring boards	629	Flooring grade Heavy flooring board
Hardwood joinery timber	1099	Knotty grade
Hardwood strip flooring	281	As specified
Wooden ceiling and paneling boards	1039	As specified
Laminated timber (glulam)	1460	As specified
Gypsum, plasterboard	266	-
Wood fibreboard	540	As specified
Wood wood panels (cement bonded)	637	-
Fibre cement sheets: profiled and flat	685	As specified
Fibre cement boards	803	As specified
Plywood and composite board	929	As specified
Particle board: highly moisture resistant Exterior and flooring type	EN 312)	Parts 1 to 7
Particle board: interior type	EN 312)	
Decorative laminates	SABS ISO) 4586 and) SABS 1405)	High pressure
Decorative Melamine Faced Boards	1763	
Wooden doors (flush)	545	-
Materials for thermal insulation of buildings	1381	As applicable
Mild steel nails	820	-
Metal screws for wood	1171	-
Creosote	538	As specified
Timber roof trusses	0243	SABS Code of Practice

CEILINGS AND PARTITIONS

Refer to Joinery Fittings regarding specifications and requirements of materials.

IRONMONGERY

Materials

- i) Locks are to comply with **SABS 4** as applicable.
- ii) Door closers are to comply with **SABS 1510** as applicable.
- iii) Symbolic safety signs are to comply with **SABS 1186** as applicable.

All ironmongery, unless other wise described, is fixed to timber.
Sheet steel furniture to comply with **SABS 757** as applicable.

METAL WORK

Rates are to include for cutting to lengths, splay cut ends, shaping, holing, tapping, threading, forging, turning, fitting, assembling, welding, filing smooth, preparation, priming coats, hoisting, temporary bracing and fixing in position.

Electro-plating is to comply with **SABS ISO 1456** as applicable.

Aluminium Windows and Doors

NOTE:

Glazed aluminium alloy windows and sliding doors for external use are to comply with **SABS 1651** as applicable.

All items must conform to and carry the Certification Seal of AAAMSA and no items which are not so certified will be accepted on site.

The work is to be cleated and framed.

All visible surfaces are to have a 25 micron anodized finish as specified.

Anodised coatings on aluminium are to comply with **SABS 999** as applicable.

Rates are to include for setting up and building in as well as for isolation material between the aluminium surfaces and adjacent surfaces of a differing material.

All visible surfaces are to be covered with a temporary protective tape, later to be removed.

Float glass for glazing is to comply with **SABS EN 572 Part 2** as applicable.

Safety and security glazing materials for buildings is to comply with **SABS 1263 (1)** unless otherwise described. All panes are to be marked so as to be visible. Laminated safety glass is to carry a written five-year guarantee.

Windows and doors are to be watertight.

Silicon pointing to windows and doors is elsewhere.

PLASTERING

Rates for new plaster, screeds, etc. to existing surfaces are to include for all preparatory work and forming a key.

Removal of paint and/or varnish as well as the roughening of the existing face brick surfaces both externally and internally to receive new plaster has been measured separately.

Plaster and screeds, etc. in patches is generally of an isolated nature and to existing surfaces. Portion of the work may be in narrow widths.

Where alterations are to be done to the existing structure, the new plaster, etc. has been measured to a point 300 mm beyond the line of the alteration on the existing structure.

TILING

Ceramic Wall and Floor Tiles are to comply with **SABS 1449** as applicable.

PLUMBING AND DRAINAGE

Water Supply and Drainage for Buildings is to comply with **SABS Code of Practice 0252** as applicable.

Water Supply and Distribution System Components is to comply with **SABS 1808** as applicable.

Electrical Water Heater - Storage Heaters to comply with **SABS 151**.

Instantaneous Heaters to comply with **SABS 1356 and IEC 60335 (2-25)**

GLAZING

Glass (Basic soda lime silicate glass products) is to comply with:

SABS EN 572 Part 1	-	Definitions and General Physical and Mechanical Properties
SABS EN 572 Part 2	-	Float Glass
SABS EN 572 Part 3	-	Polished Wire Glass
SABS EN 572 Part 4	-	Drawn Sheet Glass
SABS EN 572 Part 5	-	Patterned Glass

Safety and security materials are to comply with **SABS 1263** as specified.

Laminated safety glass is to carry a written five-year guarantee.

HOT DIP GALVANISING: ALL HOT DIP GALVANISING ARTICLES

SHALL COMPLY WITH THE FOLLOWING STANDARDS:-

General:	Hot Dip Galvanising to SABS ISO 1461
Tubing:	Hot Dip Galvanizing to SABS EN 10240
Sheeting:	Hot Dip Galvanizing to SABS ISO 4998
Sheeting:	Structural Galvanizing to SABS ISO 3575
Fasteners:	Hot Dip Galvanizing to not exceeding 90 ym
	Code of Practice of Hot Dip Galvanizing to SABS ISO 14713

GENERAL NOTE:

All SABS Standards referred to herein shall be deemed to be omitted and replaced by the redesignated and renumbered "SANS" Reference (i.e. South African National Standards) as applicable.

**NEW 2 X 6 BED STAFF ACCOMMODATION UNITS
AT MPILA CAMP IMFOLOZI GAME RESERVE**



**PART D2.2:
ELECTRICAL SPECIFICATIONS**

ELECTRICAL SPECIFICATION

**PROJECT:
IMFOLOZI GAME RESERVE – MPILA CAMP 2**

Contents

PART A: GENERAL SPECIFICATIONS.....	3
A1. DESCRIPTION OF WORK	3
A2. DESIGN CRITERIA	4
A3. EARTHING AND LIGHTNING PROTECTION	7
A4. LIGHTING FIXTURES	10
A5. CIRCUIT WIRING AND OUTLET POINTS.....	15
A6. DUCTS AND POWER SKIRTING	20
A7. TESTING	23
A8. STREET AND AREA LIGHTING.....	26
A9. LV CABLES	34
A10. SWITCHBOARDS AND DISTRIBUTION BOARDS	40
A11. CONDUIT AND OUTLET BOXES.....	47
PART B: PARTICULAR SPECIFICATIONS	56
B1. DETAILED SCOPE OF WORK.....	56
B2. DRAWING SCHEDULE	57
B3. LUMINAIRE SCHEDULE	58

PART A: GENERAL SPECIFICATIONS

A1. DESCRIPTION OF WORK

A1.1 RELATED DOCUMENTS

A. The requirements of the General Conditions, Supplementary Conditions, technical specifications and Drawings apply to all Work herein and forms part of the scope of work.

A1.2 SCOPE

A. General: Provide all labour, materials, tools, machinery, equipment, supplies, transportation, storage, utilities, appliances, hauling, hoisting, excavation, backfill, supervision, and services necessary to complete the Electrical, Communications, and Electronic Work under this Contract. Coordinate Work with the Work of the other trades so as to resolve conflicts without impeding job progress.

B. Examine the Architectural, Structural, Mechanical, Plumbing, and Electrical Drawings and other Sections of the Specifications in order to determine the extent of Work required to be completed. Failure to examine all the Contract Documents for this Project will not relieve the Contractors of the responsibility to perform all the Work required for a complete, fully operational and satisfactory installation.

C. Project Location: The Work to be performed under this Contract is in connection with the construction and erection of **the electrical installation at the Imfolozi Game Reserve, St. Lucia Estuary, Kwazulu-Natal.**

D. Work Included: The Work includes, but is not limited to, the supply installation and commissioning of material and equipment associated with the following systems, equipment, and services:

A1.2.1 ELECTRICAL SYSTEM

- 1.1. Supply, Installation, testing and handing over main supply cables from existing supply point to new distribution boards.
- 1.2. Supply, Installation, testing and handing over of power and lighting
- 1.3. Testing and commissioning of the full electrical system

A2. DESIGN CRITERIA

A2.1 CODES AND STANDARDS

A. Code Design Basis: The following codes and ordinances were used in the design of the project and shall be complied with during construction of the project.

- a) The Occupational Health and Safety Act no. 85 of 1993, as revised, whereby SANS 10142 is enclosed.
- b) Government notices.
- c) The Local Government Ordinance 1939 (Ordinance 17 of 1939) as amended and the municipal by-laws and any special requirements of the local supply authority,
- d) The Fire Brigade Services Act 1993, Act 99 of 1987 as amend,
- e) The National Building Regulations and Building Standards Act 1977 (Act 103 of 1977) as emended,
- f) The Post Office Act 1958 (Act 44 of 1958) as amended,
- g) The Electricity Act 1984 (Act 41 of 1984) as amended,
- h) The Regulations of the local Gas Board where applicable.

B. Standards: Refer to standard specifications for general administrative/procedural requirements related to compliance with applicable standards. This Work and all materials shall meet the standards set forth in the applicable portions of the following recognized standards:

- a) Building Code – SANS 10400
- b) Electrical Wiring Code – SANS 10142
- c) All other relevant SANS Codes

A2.2 COMPLIANCE WITH STANDARD SPECIFICATIONS

Except where otherwise specified, the equipment shall comply with the current editions of the relevant specifications of the South African Bureau of Standards and the British Standards Institution or the International Electro Technical Commission recommendations.

A2.3 SITE AND SYSTEM CONDITIONS

A2.3.1 Site Conditions

Altitude:	The altitude in the area varies between 80 m and 540 m above mean sea level.
Temperature:	Ambient temperature between 13°C and 24°C. Average daily maximum ambient: 32°C.
Humidity:	Maximum – 99 % Average – 71 %
Rainfall:	Approximately 1090 mm per annum. An average of 2 – 3 working days per month is lost due to inclement weather. No claims for delays as a result of adverse weather conditions will be considered.
Lightning:	The area is subject to severe lightning storms, approximately 4,5 flashes/km ² /year.
Pollution:	It is continually subject to strong wind and a saline corrosive air being on the coast.
Wind:	Design wind speed of 108 km/h (700 pa).

Mean annual value of solar radiation: 1,0 kW/m²

A2.3.2 Electricity Supply System

The nominal system voltage is 11 kV, 400 V three phase and 230 V single phase.

The maximum MV system voltage is 12,5 kV.

The system frequency is 50 Hertz and the phase rotation is R-W-B anti-clockwise.

A2.4 GENERAL REQUIREMENTS

A2.4.1 Safe Design and Standardization

All equipment supplied and installed under this contract shall be designed:

- To prevent any injury to personnel employed on the construction, operation and maintenance of the plant.
- To facilitate inspection, cleaning and repair of the equipment.
- To operate continuously and satisfactorily in the prevailing site conditions.
- To be able to withstand without damage such sudden variations of electrical load as may be met under normal working conditions, including short circuits and lightning strikes.
- To obviate risks of accidental short-circuits due to animals, birds and insects.
- To avoid pockets in which water can collect in outdoor equipment.
- To avoid condensation in closed compartments by the provision of adequate ventilation or where necessary, heaters.
- Such that conductors can carry normal load and fault currents without overheating or other damage.
- Such that moving parts can be readily lubricated. Grease nipples shall be provided in accessible positions for this purpose.
- To be vermin proof.
- To be corrosion resistant.

A2.5 QUALITY OF MATERIALS AND WORKMANSHIP

All materials and equipment for this Contract shall be new and undamaged. Corresponding parts shall be interchangeable.

Where so directed by the specification or by the Engineer, the Contractor shall provide samples and test certificates of materials for approval.

The labour used by the Contractor shall at all times be adequately qualified and experienced for the particular task.

A2.6 FIXINGS AND CONNECTIONS

A. Nuts and Bolts: Metric size nuts and bolts shall be used unless otherwise specified. Each bolt or stud shall project at least one thread but not more than 6 mm from the nut. Special spanners shall be provided where nuts and bolts are not easily accessible. The nuts on the moving plant or plant subject to vibration shall be fixed by means of locknuts, “Loctite” or other approved locking method. Bolts and studs shall be adequately sized to carry the loads, which may be imposed on them.

B. Materials of Nuts and Bolts: Only stainless steel nuts, bolts and washers shall be used for all electrical connections.

A2.7 NON CORRODING MATERIALS

A. Because steel corrodes rapidly in the coastal conditions pertaining to Umfolozi Game Reserve, **non-corroding materials** shall be used in the construction of outdoor equipment and plant. This includes all kiosks, trays and clips,

B. The permissible grades and alloys are as follows:

Stainless Steel:	Grade 316 or better
Extruded Aluminium:	6082-T6
Cast Aluminium:	L-2520
Glass fibre:	To the relevant SANS specification

A2.8 GALVANISING AND PAINTING

Umfolozi Game Reserve has a highly corrosive atmosphere and special attention shall be given to all finishes.

NO drilling, cutting, bending, punching, welding and forming of the steel or any surface damage shall be allowed **after galvanising** or painting.

All the steel work shall be prepared, hot dipped galvanised and painted using the processes detailed hereunder:

A: For all unpainted steel work:

- Pickle,
- Hot dip galvanised in accordance with SANS 121.

B: For all painted steel work

- For the primer coat: Apply a single coat of Epoxy Prima to a minimum of 40 microns dry film thickness.
- For the intermediate coat: Apply a single coat of Highbuild Aluminium Flake Filled Epoxy to a minimum of 125 microns dry film thickness.
- For the final coat: Apply a single coat of a Highbuild Aluminium Flake Filled Epoxy to a minimum of 125 microns dry film thickness.

C. Damage to paint work during transit or erection shall be touched up with matching paint.

A3. EARTHING AND LIGHTNING PROTECTION

A3.1 CODES AND STANDARDS

A. Codes and Standards: The earthing and lightning protection shall comply fully with the applicable SANS specifications as set out below and all equipment shall bear the mark of approval of the South African Bureau of Standards.

- a) The latest issue of SANS 10313: Protection against lightning - Physical damage to structures and life hazard Requirements of surge protective devices
- b) The latest issue of SANS 61312: Requirements of surge protective devices
- c) The latest issue of SANS 62305: Protection against lightning
- d) The latest issue of SANS 10292: Earthing of low-voltage (LV) distribution systems
- e) The latest issue of SANS 10199: The design and installation of earth electrodes
- f) The latest issue of NRS076: Earthing of distribution substations with nominal voltages up to and including 132 kV

B. Manufacturers: If they comply with these specifications and requirements will be acceptable.

C: Installers: The electrical contract shall appoint a specialist Earthing and Lightning Protection Contractor to design and install the earthing and lightning protection system. The specialist installer must be certified or registered installers of the manufacturers or their representatives. Manufacturers or their representatives must also have registered offices in South Africa and the local office must carry sufficient stock and spare parts for the project.

A3.2 SCOPE OF WORKS

The specialist contractor shall:

- Carry out earth resistivity tests on the site of works and provide a test results certificate together with recommendations of the installation to the Engineer.
- Once approved, Supervise the installation in compliance with SANS requirements.
- Carry out interim earthing tests and if below required value, improve on earthing installation until earthing values are achieved.
- Provide as-built drawings of the complete earthing and lightning protection system.
- Provide test certificates and a sign-off certificate of the completed earthing and lightning protection system.

A3.3 DESIGN CRITERIA

A provisional earthing and lightning protection system is indicated in the Bill of Quantities.

Earthing shall be installed in trenches of 600mm deep below finished ground level (FGL)

The tops of the earth rods shall be no less than 600mm below FGL with rods installed vertically. If this is not achievable, then rods should be installed in a horizontal position and indicated on as-built drawings.

Final measures will be based on installed quantities up to the Bill measured values only. Material above bill measured quantities shall be approved by the Engineer prior to installation.

A3.4 EARTHING OF SUBSTATIONS

All substations shall be earthed in accordance with the requirements of the supply authority. If no earthing is specified and no specific requirements of the supply authority exist, the following method shall be adopted.

A main earth bar (minimum cross-sectional area 50 mm x 6 mm and of HDHC copper) must be provided and fixed to the high voltage room wall by means of shock proof insulators. Suitable space shall be provided between the earth bar and the wall.

All earth wires shall be secured to the earth bar by means of 10 mm diameter brass bolts. Lock nuts shall be provided for all terminals.

The following connections shall be made from this earth bar system:

1. 70 mm² insulated stranded conductor to the transformer neutral.
2. Copper tape to the transformer tank.
3. 70 mm² bare copper earth conductor to MV switchgear earth bar.
4. 70 mm² copper earth conductor to switchgear frame and board.
5. 2 x 70 mm² bare copper earth conductors to earth mat/earth rods.

Where necessary, earth connections shall be protected against mechanical damage and corrosion. Two earth rods shall be driven into the ground in the immediate vicinity of the substation at least 3m apart with their tops not less than 600 mm below ground level. The rods shall be interconnected with a 70 mm² bare copper conductor buried at a depth of not less than 750 mm. A 70 mm² earth conductor shall be taken from each of the two earth rods to the main earthing bar in the high voltage room.

A3.5 EARTHING OF SWITCH ROOMS

The earthing of switch rooms shall conform to the earthing requirements of substations as described above.

A3.6 EARTHING OF OUTDOOR EQUIPMENT

In cases where substations contain transformers or switchgear installed outdoors, the compulsory fence, if no other method is specified, shall be earthed as follows:

1. A 70 mm² earth conductor shall be installed 400 mm below ground level and 500 mm from the fence on the outside of the substation along the entire perimeter of the fence. This earth conductor shall be earthed at each corner by means of a 1,8m earth rod and the rod and earth conductor bonded to the fence.
The earth conductor shall be bonded, at least at two points, to the main earthing system.
2. A 70 mm² earth conductor shall also be buried at a depth of 400 mm around each transformer and switch and bonded to the main earthing system.

A3.7 EARTHING OF BUILDINGS

All hot and cold water pipes and discharge pipes shall be interconnected by means of 12 x 1,6 mm solid or perforated copper tape and clamped with brass bolts and nuts. Copper tapes shall be fixed to walls by means of brass screws at intervals not exceeding 250mm.

Iron roofs, gutters, down-pipes, etc., shall be interconnected in the same way.

Connections shall be carried out with brass bolts and nuts (not self-tapping screws).

Iron roofs shall be connected at intervals not exceeding 15m with a common earth conductor of bare copper wire. The common earth conductor shall run under the roof over the full length firmly fixed to the upper purlin.

This earth conductor shall also be connected to the main earth conductor of every distribution board. When plastic conduit is used, a 2,5mm² bare copper conductor shall be installed throughout for earth continuity.

This copper conductor shall be securely fixed to all metal appliances and equipment, including switch boxes, socket outlet boxes, draw boxes, switchboards, luminaires etc.

A3.8 EARTHING OF LV SYSTEMS

A separate earth connection shall be installed from every sub-distribution board to the earth terminal on the main distribution board. These earth connections shall consist of bare copper conductors, drawn into conduit or piping, together with PVC conductors or cables.

Socket outlets shall be connected with 2,5 mm² earth conductor to the earth busbar in the relative distribution board.

The earth terminals of lighting circuits shall be connected to the nearest earth terminals by means of 2,5 mm² stranded copper conductors.

A readily accessible earthing terminal shall be provided for the bonding of other services such as a telephone, an audio or a video system, and the like, to a building. Such an earth terminal shall be bonded to the consumers earth terminal by a conductor of at least 6mm² copper or equivalent, and shall be identified by the earth symbol. Labels shall be fitted to all distribution boards where the readily accessible earthing terminal for the bonding of other services is provided.

The earth terminals on the main distribution board shall be earthed by means of a 70 mm² bare copper conductor connected to the earth mat.

A3.9 EARTHING OF INSTALLATION

The trench earth shall consist of minimum 70mm² bare copper conductor buried in a 600mm trench around each building.

Roofs, gutters and down pipes: All metal parts of roofs, gutters and down pipes shall be bonded and earthed. The roof and gutters shall be connected at 15m intervals or as shown on the drawings to this conductor by means of 50mm² down conductors or equivalent as approved by the engineer in 20mm PVC conduit. All bolts and nuts to be galvanised. Self-tapping screws are not acceptable. The earth should be connected to the earth mat.

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 all sub-circuits shall be connected to the earth busbar in the supply board in accordance with SANS 10142.

Non-metallic Conduit: Where non-metallic conduit is specified or allowed, the installation shall comply with the specification for “conduit and conduit accessories”.

Stranded 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.

A3.10 LIGHTNING PROTECTION

The lightning Protection system shall be designed and installed by a certified specialist contractor.

The lightning protection system of buildings and structures shall include:

- Bonding of metal roofs and structures
- Installation of 8mm aluminium Lightning conductor on concrete and non-metallic roof structures
- Bonding of lightning protection system with earthing system.

The contractor to use approved methods for joints, terminations and bonding.

- Lightning conductors shall be fixed to walls and parapets by means of raised galvanised saddles and secured onto the structure.
- If waterproofing is installed, lightning conductors to be installed above the waterproofing membrane.
- Care must be taken to prevent damage to waterproofing membranes and any damage or penetration onto waterproofing membranes must be first approved by the waterproofing installers prior to drilling/cutting.
- All repairs to waterproofing membranes must be done by the specialist waterproofing installers at the contractors cost.
- Down conductors to be 50mm copper conductor in PVC conduit to the earth mat of test points as indicated on the drawings.
- Test points shall be installed 600mm above finished ground level in a suitably approved IP65 box with a removable cover.
- Test points shall be provided with a bolted connection and labelled for future testing.
- Down conductor tails from the test point to earth mat/rod shall be of 50mm² copper conductor and to be exothermically welded onto the earth mat/rod. No crimps or clamps will be allowed.
- All drilling of holes onto structures and frames and re-instatement of protective coatings, eg. paint or galvanising shall form part of this contract.
- All connections to earth rods and conductor joints shall be by means of exothermic welds.
- Bonding to steel reinforcing shall be by means of approved clamps.
- All connections between different metals shall be by means of suitable bi-metal connections.

A4. LIGHTING FIXTURES

A4.1 CODES AND STANDARDS

A. Codes and Standards: The lighting fixtures shall comply fully with the applicable SANS specifications as set out below and all equipment shall bear the mark of approval of the South African Bureau of Standards. The latest issue of the SANS codes will be applicable:

- a) SANS 475: Luminaires for interior lighting, streetlighting and floodlighting - Performance requirements
- b) SANS 1464: Safety of luminaires Part 22: Luminaires for emergency lighting
- c) SANS 10114-1: Interior lighting Part 1: Artificial lighting of interiors
- d) SANS 10114-2: Interior lighting Part 2: Emergency lighting
- e) SANS 10389-1-3: Exterior lighting Part 1-3
- f) SANS 61547: Equipment for general lighting purposes – EMC immunity requirements
- g) SANS 62560: Self-ballasted LED lamps for general lighting services by voltage > 50V - Safety specifications
- h) SANS 62031: LED modules for general lighting – Safety specifications
- i) SANS 60598: Luminaires - Part 1: General requirements and tests
- j) SANS 1662: Self ballasted LED Tubular lamps for general lighting services > 50V - Safety requirements.

- k) SANS 62612: Self ballasted LED lamps for general lighting services with supply voltages > 50V - Performance requirements.

B. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:

The manufacturer must be an ISO9001 certified company. Proof of certification is to be submitted together with the tender document, failing which the tender may be disregarded. Products must carry the SABS mark or an international certification and approved for use in South Africa.

A4.2 FLUORESCENT LIGHTING FIXTURES

A. General: Furnish and install fluorescent lighting fixtures of the types and manufacturers scheduled on the Drawings. Fixtures shall be furnished with all required accessories and trim as required for a complete installation in the ceiling type shown on the Architectural Drawings.

B. Lamps: Fluorescent fixtures shall be complete with lamps of the type, colour, wattage, and size indicated on the Lighting Fixture Schedule.

D. Ballasts:

1. General: Ballasts for use on 230 Volt systems shall be suitable and guaranteed for a voltage range of 205 Volts to 240 Volts. Ballasts for use on 400 Volt systems shall be suitable and guaranteed for a voltage range of 380 Volts to 420 Volts.

2. Electronic Ballasts: Fluorescent fixtures indicated to be provided with electronic ballasts shall be complete with parallel wired, Class "P" thermal protected, electronic ballasts certified by CE and complying with SANS limits governing EMI and RFI.

a. Electronic ballasts shall comply with SANS standards for surge protection. Total harmonic distortion shall not exceed 10%. Ballast case operating temperature shall not exceed 60°C.

Electronic ballasts shall be capable of starting at temperatures of 0°C or higher. Power factor shall not be less than 0.95.

3. Dimming Ballasts: Wherever fluorescent fixtures are to be dimmed, the fixture supplier shall coordinate the type of dimming ballast to be used with the dimming equipment supplier to insure compatibility. The fluorescent lighting fixtures shall be provided with circuit interrupting lamp holders as required for the single or double lamp dimming ballasts being used.

4. Low Temperature Ballasts: Unless otherwise indicated, where fluorescent lighting fixtures are installed in unheated areas of the building(s) or parking garages, or where installed outdoors, the fixtures shall be provided with the appropriate ballasts with a minimum Sound rating as recommended by the manufacturers.

5. Low Leakage Ballasts: Where fluorescent fixtures are installed on isolated power circuits, low leakage ballast suitable for isolated power use shall be provided.

E. Louvers: Lighting fixture louvers shall be, pre-anodized aluminium semi-specular low-iridescent parabolic louvers. Louver shall be securely fastened with T-hinges and spring-loaded cam latches. The louver should be capable of hinging and latching from either side. All steel parts, excluding fasteners, shall be painted after fabrication. Pre-coat finishes shall not be acceptable.

F. Fluorescent fixtures in continuous rows shall be supplied with all fixture couplings, close nipples and/or other accessories recommended by the manufacturer for continuous row installation.

G. Guards: Fluorescent strip fixtures with exposed bare lamps shall be provided with guards as required by safety codes.

A4.3 LED LIGHTING FIXTURES

A. General: Furnish and install LED lighting fixtures of the types and manufacturers scheduled on the Drawings. Fixtures shall be furnished with all required accessories and trim for a complete installation in the ceiling type shown on the Architectural Drawings.

B. Lamps: LED fixtures shall be complete with lamps of the type, colour, wattage and size indicated on the Luminaire Schedule, or as specified by the lighting fixture manufacturer. Unless otherwise noted, all lamps shall be Cool white.

C. Minimum requirements:

- The minimum lamp life should be equal or greater than 30 000 hours
- The Colour Rendering Index (CRI) must be 80 or greater
- Power factor must be greater than 0.9
- Test reports from an approved and accredited test laboratory must be submitted when called for.
- Alternate fixture manufacturers shall submit computer generated illumination calculations and files (.ies) to the engineer for approval

D. Luminaire Markings: All products shall be marked according to SANS 62031 as follows:

- Lamp rating in Watts
- Lamp life in hours
- Colour Correlated Temperature (CCT) or colour name
- Colour Rendering Index (CRI)
- Initial lamp life output
- Energy Efficiency Marking /label per SANS codes

A4.4 AREA AND FLOODLIGHTING FIXTURES

A. Area and Floodlighting fixtures have been selected for specific features, beam characteristics and style. Alternate fixtures will be considered for approval based upon compliance with procedures as described below.

B. Alternate fixture manufacturers shall submit computer generated illumination calculations and files (.ies) to the engineer for approval

C. Floodlighting fixtures shall consist of a cast aluminium housing and housing door assembly. The housing shall contain the optical components and a removable ballast drawer assembly. The unit shall be supported by cast aluminium, adjustable mounting bracket. The unit shall contain no weep or drain holes. A filtered vent hole into the fitter chamber shall be provided. The entire unit shall be classified as a sealed type. It shall bear a IP rating.

D. Housing shall be a single piece aluminium casting, forming a watertight shell. It shall contain the electrical and optical component compartments.

E. Housing door shall be cast aluminium and shall hold a tempered heat and impact resistant clear glass lens. It shall be gasketed with high temperature resistant gasket and shall be hinged to the fixture housing with a non-corrosive hinge assembly. It shall be held closed with corrosion resistant captive screws, or stainless steel, spring loaded, quick release latches.

F. All gasketing material shall be high temperature resistant rubber. All areas that are gasketed shall be of metal to metal or metal to glass interface contact design, to control gasket compression. All gasketing shall provide component compartment sealing, to prevent external atmospheric containment intrusion.

G. Ballast assembly shall be a self-contained, removable tray assembly of modular design and shall contain all electrical components of the ballast. It shall have a polarized, quick disconnect, mate and lock power input plug. It shall be field interchangeable without requiring the luminaire to be

removed. The ballast shall be specifically designed for the lamp type specified and at the voltage specified. Ballast shall be constant wattage autotransformer, high power factor type, with starting current less than operating current.

H. The socket shall be mogul porcelain enclosed and shall have a spring-loaded, centre contact. It shall be properly positioned to allow correct location of the lamp in the reflector assembly. It shall be specifically designed to withstand the high voltage impulse needed to start the lamp.

I. Reflector assembly shall be construction of high purity, reflective aluminium material, and shall be designed to provide optimum photometric results in conjunction with the fixtures and the light sources for which they are designed. Fixtures must be available with a minimum of four different reflector assemblies to provide various photometry performances.

J. Glare shields will be available.

K. All painted parts shall be coated with powder coat thermoset polyester enamel, formulated to provide no appreciable fading, blistering, or peeling within five (5) years. Colour shall be as specified in the lighting schedule.

A4.5 SUBMITTALS

A. Shop drawings submittals shall include, but not be limited to, the following:

1. Cut sheets on all lighting fixtures with all accessories and details clearly indicated.
2. Cut sheets and complete technical data on ballasts, lamps, lens, poles, etc.
3. Photometric performance data.
4. Computer generated illumination calculations in the latest Dialux format and files (.ies) to the engineer for approval
5. Additional information as required.

A4.6 INSTALLATION

A. All lighting fixtures shall be furnished complete with mounting accessories to suit the specific service and installation intended. The Electrical Contractor shall verify the required fixture ceiling/trim coordination prior to light fixture orders.

B. Fixtures shown on the fixture schedule to be recessed shall be complete with plaster frames, mounting yokes, rod hangers, etc., and/or any other accessories required to fit the fixture to the ceiling construction.

However, where ceiling system cannot maintain said support, provide supplemental steel support members connected to the building structure capable of carrying the weight of the fixture plus 100kg at each support without sagging. Provide the necessary supports for hangers located between structural members. Securely fasten the luminaire to the ceiling framing members. In plaster ceilings, provide threaded hanger rods secured to the main ceiling suspension structure and supplementary horizontal steel members as required, and to the luminaire housing, using two nuts at each end of rod.

C. Connect each ceiling-recessed luminaire into the conduit system by means of flexible cable with plug top not more than 3m or less than 1.2m in length routed from an above-ceiling outlet point.

D. Provide alignment clips on all pendant or ceiling mounted luminaries used in continuous rows.

E. Chain-suspended lighting fixtures shall be connected to the outlet box mounted directly above the fixture using flexible metallic conduit, and the flexible metallic conduit shall be strapped to the fixture chain.

F. Fixture supports shall be provided in all outlet boxes from which fixtures are suspended. Fixtures shall not be suspended by means of cover or canopy screws. Canopies shall completely cover the ceiling opening of all ceiling fixtures except lay-in fixtures in T-bar construction, and trimless fixtures.

G. Where surface mounted lighting fixtures (i.e., exit lights, etc.) are installed on lay-in panels in T-bar ceiling construction, the outlet boxes shall be rigidly supported to the ceiling system using metal channels spanning perpendicular across the T-bars and securely attached to each side of the outlet box.

H. Connect each fixture housing to the equipment grounding conductor by means of a crimped spade-type terminal connector secured to the housing with a self-tapping screw.

I. All fixtures shall be clean at the time of acceptance of the Work, and shall be properly aimed or adjustable as required. No extra will be permitted for cleaning, aiming or adjustable fixtures to meet the requirements of the Engineer at the time of acceptance of the Work.

J. All lamps used during construction and prior to final inspection, shall be replaced prior to final acceptance of the building by the Owner.

K. The locations indicated for outlet boxes of lighting fixtures are diagrammatic. Outlets shall be located as required to coincide with suspension hangers where they occur and with structural architectural elements of the building and shall be located in accordance with the Architectural Reflected Ceiling Plan (RCP).

A4.7 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 or 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".

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.

A4.8 LUMINAIRE IDENTIFICATION

Lighting outlets are numbered on the drawings.

The numbering of the outlets defines the circuitry and control required. Each luminaire shall be furnished with the wattage and colour as specified or as implied by the catalogue number of the luminaires specified.

The luminaire shall bear the SANS 60598-2-3 and SANS 60598-2-5 safety mark or equivalent International rating. The luminaire shall have a Ta rating not less than = 40°C. The luminaire shall

be manufactured by an ISO 9002 accredited company. The luminaires company shall be a ISO Marked Bearing Company or International Equivalent.

A4.9 GENERAL

The electrical subcontractor shall only commence with the installation of light fittings after the paintwork in the vicinity of the fitting is complete and dry. Care shall be taken to ensure that ceiling boards and paintwork is not damaged during the installation of light fittings.

The type of light fittings to be used are indicated and specified on both the relevant drawings as well as in the lighting schedule.

Positions of light fittings: The mounting positions of light fittings are indicated on the relevant drawings and shall be verified on site.

Mounting heights of light switches: Light switches shall be installed 1,4 metres above finished floor level unless specified to the contrary.

Mounting of light fittings: Surface mounted fittings shall be screwed to the ceiling by means of at least two 4 mm diameter electroplated self tapping screws. On concrete, plastered and brick surfaces good quality plastic expansion plugs shall be used and on suspended and soft ceilings a solid timber backing strip of at least 40 x 40 mm timber shall be supplied and installed between supports and the screws fixed to these backing strips. Surface mounted fluorescent fittings will be firmly mounted to ensure close contact with the ceiling over the entire length of the fitting. On concrete slabs the fittings shall be mounted by means of two screws into the ceiling conduit box as well as two round headed 4 mm x 30 mm electroplated self tapping screws and plastic expansion plugs, one at either end. On suspended ceilings the fittings shall be similarly mounted but timber backing strips of at least 40 x 40 x 450 mm shall be placed in position on top of the ceiling board and the end screws secured to these strips to spread the load.

A5. CIRCUIT WIRING AND OUTLET POINTS

A5.1 CODES AND STANDARDS

A. Codes and Standards: 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.

- a) The latest issue of SANS 60614 and SANS 61035, parts 1 and 2: Metallic conduit and accessories
- b) The latest issue of SANS 950: Non-metallic conduit and accessories
- c) The latest issue of SANS 1507: Electric cables with extruded solid dielectric insulation for fixed installations.

A5.2 CONDUCTORS

A. All wiring shall, unless expressly stated otherwise in the detail specification, comprise of PVC insulated, stranded copper conductors and bare stranded copper or green PVC insulated, stranded earth continuity conductors. The conductors shall comprise of high conductivity annealed stranded copper conductors and shall be insulated with general purpose PVC, of the 600/1000 grade. All conductors used for the wiring of the electrical installation shall comply with SANS 1507.

Conductors shall be from new stocks and shall be delivered to site with unbroken seals.

B. PVC insulated unarmoured cables with a bare earth conductor

(i) General: This section covers the following PVC insulated unarmoured cables with a bare earth conductor:

- (1) PVC insulated flat multicore cable with a bare earth conductor

(2) PVC insulated round multicore cable with a bare earth conductor and with metal stiffening.

The cable shall comply with the requirements of SANS 1507.

(ii) Installation: The cables shall be installed in accordance with SANS 1507 and as specified in the detail specification.

The cables shall be terminated by means of PVC glands fitted with a neoprene seal. The neoprene seal shall have a round opening for the round multicore cable and a rectangular shaped opening for the flat multicore cable.

C. Wiring terminals: Terminal bodies and screws shall be constructed from non-corrosive metal, enclosed in fire resistant, moulded plastic insulating bodies. No part of the terminal body or fastening screws shall project beyond the insulating material which shall afford suitable protection against accidental contact by personnel and against short circuits or tracking.

The terminal block and its associated mounting rail shall be constructed in such a manner as to ensure a firm and positive fastening of the terminal block to the rail. Terminal blocks shall be held in position by means of standard end clamps. It shall furthermore be possible to extend the terminal block by adding additional terminal blocks within the terminal sequence without having to disconnect or dismantle the terminal strip.

It shall be possible to intermix terminals of various sizes, for different conductor sizes, whilst utilising the same mounting rail. Where smaller terminal blocks occur adjacent to larger terminal blocks, suitable shielding barriers shall be inserted to conceal the terminals that might otherwise be exposed.

The terminal bodies and clamping screws shall be so constructed as to ensure that conductors are not needed or severed when the clamping screws are tightened. Screws shall not come into direct contact with the conductors. Each terminal block shall have provision for clip-in numbering or labelling strips to be installed, together with protective, clear caps over the sheets.

A5.3 INSTALLATION

A. The electrical subcontractor shall ensure that the wiring of the electrical installation for the building or other structure is carried out in accordance with SANS 10142.

B. Wireways: All unarmored conductors shall be installed in conduits, trunking or power skirting and such conductors shall under no circumstances be exposed.

C. Circuits: The circuits for the complete electrical installation are indicated on the relevant drawings. The following are the maximum number of points normally connected to each type of circuit unless otherwise indicated on the drawings:

Light points per circuit = 8
Socket outlets per circuit = 4
Airconditioner points per circuit = 2
Stoves, etc = 1

Conductors supplying circuits which are fed from different switchboards shall not be installed in the same wireway. The wiring of one circuit only will be allowed in a 20 mm diameter conduit, with the exception of the wiring from switch boards to fabricated sheet metal boxes located close to switchboards, in which case more than one circuit will be allowed. For larger conduit sizes the requirements of SANS 10142 shall be met.

D. Looping and joints: A loop-in wiring system where conductors are looped from outlet to outlet shall be employed. Joints in conductors shall be avoided as far as possible but where it becomes unavoidable, joints will be accepted in cable channels only and not in conduits. Joints shall be soldered or shall alternatively consist of approved ferruling properly covered with the correct size heat-shrink sleeves. The use of PVC insulation tape is not acceptable.

E. Grouping of conductors: In cases where the conductors of more than one circuit are installed in the same wireway, the conductors of each separate circuit, including the circuit earth continuity conductor, shall be grouped at intervals of at least one (1) metre using plastic cable ties. The conductors of different circuits shall however remain separate in order to ensure that any given circuit may be withdrawn from the wireway. Conductors entering distribution boards or control boards shall be grouped and bound by means of plastic cable bands. The use of PVC insulation tape for grouping conductors will not be accepted.

F. Pulling-through of conductors: The electrical subcontractor shall take utmost care whilst pulling conductors through conduit to ensure that the conductors are not kinked, twisted or strained in any manner. Care shall furthermore be taken to ensure that conductors do not come into contact with materials or surfaces that may damage or otherwise adversely affect the insulation and durability of the conductor.

G. Conductor colours: The colours of conductor PVC insulation shall comply with SANS 10142. The colours of conductors for sub-circuits shall as far as possible correspond with the colour of the supply phase. The colours of conductors for the wiring of two-way and intermediate switches shall preferably differ from the colour of phase conductors.

H. Earth continuity conductors: Bare copper earth continuity conductors or green PVC insulated stranded copper earth continuity conductors, as specified in the detail specification, shall be used throughout the installation.

When earth continuity conductors are looped between earth terminals of equipment, the looped conductor ends shall be twisted together and then ferruled or soldered to ensure that a positive earth continuity is maintained when the conductors are removed from any earth terminal.

Where bare copper earth wires are specified for circuits installed in power skirting and floorducting, the electrical subcontractor shall provide a suitable length of PVC sleeving over the bare earth conductor where it passes behind or is connected to power outlets to ensure that such an earth conductor does not come into contact with any live parts.

I. Wiring inside vertical wireways: Conductors installed in vertical wireways shall be secured at intervals not exceeding 5m to support the weight of the conductors. Approved clamps shall be supplied and installed in suitable draw-boxes for this purpose.

J. Conductor sizes: The conductor size for each circuit type is specified in the detail specification. In the event that a conductor size is not specified in the detail specification, the following minimum conductor sizes shall be used:

Circuit	Minimum Conductor (Size)	
	Phase (mm ²)	Earth (mm ²)
Lighting	1,5	2,5
Socket outlet	2,5	2,5
Stove	6.0	6.0
Air-conditioner	4.0	2.5
Geyser	4.0	2.5

K. Single pole switches: Single pole switches shall be connected to the phase conductor and shall not be connected to the neutral conductor.

L. Three phase outlets: With the exception of three phase outlets, wirings to circuits connected to different phases shall not normally be present at lighting, switch or socket outlet boxes. Where this is unavoidable, barriers shall be provided between terminals or connections of the various phases

and the box shall be suitably labelled internally and externally to indicate the presence of three phase voltages.

A separate neutral conductor shall be installed together with each three phase circuit to outlets intended for equipment connection by means of isolators or sockets, irrespective of whether the particular equipment normally requires a neutral or not.

M. Connections: The insulation of conductors shall only be removed over the portion of the conductors that enter the terminals of switches, socket-outlets or other equipment. When more than one conductor enters a terminal, the strands shall be securely twisted together.

Under no circumstances shall any of the strands be removed to enable easier insertion of the conductors into terminals.

No more than two conductors shall be permitted to be fastened to any one terminal. The electrical contractor shall take care to ensure that the copper strands are not kicked during the removal of the insulation. PVC insulated conductors shall not be used for the direct connection to equipment where the temperature exceeds 75°C, such as stoves, geysers, electric water heaters and high power LED lamps. Silicon coated or other approved conductors shall be used in such cases.

N. Terminals: Terminals shall be sized and current rated to match the conductors that are connected to them.

A5.4 POWER OUTLETS

A. The electrical contractors shall only commence with the installation of power outlets in the conduit outlets allowed therefore of the plasterer and painter have completed their work in the vicinity of the outlet.

B. Socket outlets with switches: All socket outlets with switches shall be of the standard 16A 3-pin pattern, white in colour. Emergency socket outlets shall be red, with the flattened earth pin on top. UPS outlets shall be blue, with the flattened earth pin on the right.

Units for flush mounting shall be suitable for 100 x 100 x 50 mm deep flush wall box. Surface mounted patterns shall be housed in heavy pressed steel boxes. Shutters shall be provided. All socket outlets with switches shall be continuously rated at 16A and shall be suitable for operation on a 250V, 50 Hz, a.c. system.

All socket outlets with switches shall fully comply with SANS 164 as amended. Covers shall have bevelled edges which overlap the box.

C. Isolators: Moulded case isolators shall be of the double pole ON-LOAD type.

Toggles shall be interlocked with the covers. All isolators shall comply with SANS 60947. To distinguish the switches from circuit breakers the operating handles of isolators shall have a distinctive colour and where called for in the "particular specification" the switch shall be clearly and indelibly labelled "ISOLATOR".

A5.5 INSTALLATION

A. Socket outlets and power outlets shall be installed in the positions as indicated on the drawings.

B. Socket outlets: Unless otherwise specified socket outlets shall be installed at the following heights above finished floor level, measured to the underside of the outlet:

Outlet Point	Location	Height (from finished floor level to underside of outlet)
Socket Outlet	General applications	300mm
Socket Outlet	Kitchens	1200mm
Geyser isolator	Within 1m of geyser	500mm

Heaters, fans & airconditioners	Within 1m of unit	1500mm
---------------------------------	-------------------	--------

C. Connections to geysers: Each geyser shall be connected to a separate circuit with a separate earth conductor. The conduit from the distribution board shall terminate in a 100 x 100 x 50 mm outlet box within 1 metre of the geyser. A suitably rated double pole isolator shall be installed in the outlet box. A flexible conduit shall be installed between the isolator and the geyser.

D. Connections to heaters, fans and airconditioners: A suitably rated double pole isolator shall be supplied and installed within 1 metre of heaters, fans and air conditioners. Where the equipment is out of reach the isolator shall be installed 1,5 metres above floor level. Flexible cords of sufficient rating may be used for the final connection to the equipment.
 Where control units are to be installed the units shall be installed 1,5 metres above floor level.

A5.6 LIGHT SWITCHES

A. Flush mounted switches: Flush mounted switches shall comply with SANS 60947 and shall bear the SABS mark. All flush mounted switches shall be suitable for mounting in 100 x 50 x 50 mm galvanised steel wall boxes unless otherwise specified in the detail specification.

The switch mechanism shall be of the tumbler operated micro-gap type with silent operation and shall be rated for 16 A at 250 V and 50 Hz.

Switches shall have protected terminals for safe wiring. Multi-lever switches shall be constructed so as to enable individual defective switches to be removed and replaced without having to remove the remaining switches.

The mounting holes provided on the yoke strap shall be slotted to allow for easy alignment. A brass earthing terminal shall furthermore be provided on the yoke to ensure the positive earthing of the switch assembly.

B. Switches with pilot light indication: Flush mounted switches with pilot light indication shall comply with the relevant SANS specification and shall bear the SABS mark.

Switches with pilot light indication shall be suitable for mounting in 100 x 50 x 50 mm galvanised steel wall boxes. The switch shall be rated at 16 A at 250 V and 50 Hz. A red neon indication lamp shall form an integral part of the switch level and shall light-up when the switch is in the on position.

C. Cover plates for switches: Cover plates for flush mounted switches shall have levelled edges which overlap the wall box in order to conceal all wall imperfections and shall conform to SANS 60947.

Cover plates shall be finished in ivory coloured baked enamel and shall bear the identical manufacturing batch number.

D. Surface mounted switches: Surface mounted switches shall comply with SANS 60947 and shall bear the SABS mark. Surface mounted switches shall consist of single or multiple switches, not exceeding four, and shall be mounted in a pressed steel box of heavy duty construction.

The switch mechanism shall be of the tumbler operated micro-gap type with silent operation and shall be rated for 16 A at 250 V and 50 Hz.

A brass earthing terminal shall furthermore be provided on the switch construction to ensure the positive earthing of the switch assembly and enclosure.

The covers of surface mounted switches shall have toggle protectors.

E. Watertight Switches: Watertight switches shall consist of 10A switches on porcelain bases in cast iron or aluminium alloy housing. Contacts must be of heavy duty brass construction and a quick acting spring mechanism shall be fitted. A rigid operating knob shall be clearly marked to indicate the "ON" and "OFF" positions. Conduit entry shall be provided through a tapped hole. The complete unit shall be watertight.

A5.7 TELEPHONE AND DATA OUTLETS

Telephone and data outlets in walls shall comprise of 100 mm x 100 mm x 50 mm deep wall boxes which shall be flush mounted in the wall, in the position shown on the relevant drawing, with the underside 300 mm above the finished floor level. The wall box shall be fitted with a blank cover

plate. All outlet boxes shall align up neatly with adjacent socket outlet wall boxes. Telephone and data outlets in floors fitted with floor ducting shall be of the same type as the floor outlets for power socket outlets and shall normally be provided in the same outlet box.

Telephone and data outlets in power skirting shall be provided in the positions shown on the relevant drawing and the electrical subcontractor need only provide a separate short length cover plate at these positions. The cover plate for the fixing of the telephone and data outlet shall not exceed 250 mm in length and shall be secured in such a manner that adjacent cover plate sections may be removed without disturbing the telephone outlet.

A6. DUCTS AND POWER SKIRTING

A6.1 CODES AND STANDARDS

A. Codes and Standards: The ducts and power skirting 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.

a) SANS 61084: Cable trunking and ducting systems for electrical installations

B. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:

The manufacturer must be an ISO9001 certified company. Proof of certification is to be submitted together with the tender document, failing which the tender may be disregarded.

Products must carry the SABS mark or an international certification and approved for use in South Africa.

Installers must be certified or registered installers of the manufacturers or their representatives. Manufacturers or their representatives must also have registered offices in South Africa and the local office must carry sufficient stock and spare parts for the project.

A6.2 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. The Contractor must ensure that the power trunking is installed to satisfaction of the Employer's representative before commencing with the wiring of the power trunking.

A6.3 UNDERFLOOR DUCTING

This section covers two or three compartment underfloor ducting in buildings.

The ducting and associated accessories shall be manufactured from 2 mm thick sheet steel. The sheet steel shall either be galvanised prior to the manufacturing of the ducting or shall be epoxy powder coated after manufacture. The three compartment ducting shall be subdivided into three approximately equal compartments, of which the centre compartment shall be used for electrical power distribution with the outer two compartments for other services.

Outlets shall be provided on a modular basis in the ducting for the installation of pedestal or recessed outlets. The openings shall have removable flush cover plates and shall have tapped holes for the installation of the pedestal or recessed outlets.

The underfloor ducting shall be complete with flush cross-over, T-junction and right angle bend draw boxes. The junction boxes shall be complete with cross-over of services and removal cover plates secured by means of countersunk screws.

Pedestals: Pedestals suitable for two or three services as specified shall be manufactured from die-cast aluminium or pressed steel. The pedestals shall be epoxy coated of an approved colour after the manufacturing hereof.

The underfloor ducting with accessories shall be installed strictly in accordance with the manufacturer's instructions. The ducting shall be fixed to the floor by approved means.

Upbends shall be supplied and installed where ever the ducting is terminated at distribution boards, telephone distribution boards or behind power skirting.

The power circuit wiring shall be installed in the centre compartment of the ducting. Sufficient slack shall be left in the form of a loop at each outlet in the ducting in the area to be served by the ducting. Galvanised draw wires shall be installed in the other compartments to enable cables to be drawn in by others. The entire installation shall be effectively earthed and bonded together.

A6.4 POWER SKIRTING

This section covers the supply and installing of two or three compartment power skirting.

The power skirting and covers shall be manufactured from 1 mm thick sheet steel or aluminium and shall be manufactured in modular lengths. The length of the skirting shall not exceed 2,5 metres and, unless otherwise specified in the detail specification, the covers shall be supplied in 1 metre lengths.

The covers shall either snap on or shall be fixed by means of toggle or swivel nuts. Each modular cover shall be punched and prepared for the installation of a standard three pin socket outlet. The punched holes shall be blanked off with easily removable blanking plates, painted the same colour as the power skirting. Suitable brackets shall be supplied for the fixing of the socket outlet to the channel.

All internal and external bends and off sets shall be factory made.

The power skirting and cover shall be epoxy powder coated of an approved colour after the manufacturing thereof.

Conduits for the circuit wiring to the power skirting shall be installed in the floorslabs and chased into the walls to terminate in flush conduit boxes behind the power skirting at the heights of the compartments for the telephone, power and other service compartments.

The wiring shall pass through large diameter holes, suitably bushed, cut in the rear of the power skirting.

Where power skirting is interrupted by doorways bridging conduits shall be installed for each of the service compartments.

A6.5 WIREWAY TRUNKING

A. General: This section covers the supply and installation of wireway trunking and accessories in buildings.

B. Materials: The covers of the wireway trunking shall be secured to the framework by at least four points per section. Covers shall be so designed that they can be easily removed after installation of the trunking. Sections of the trunking which pass through walls and floors shall have separate covers. Fire barriers of non-flammable, non-conducting material shall form an integral part of each section. The fire barriers shall be so placed as to prevent the spreading of fire from one floor to another.

C. Installation: Trunking shall be of the size and type as specified in the detail specification. The electrical contractor shall ensure that the trunking is installed in accordance with the routes indicated on the relevant drawings.

However should the electrical contractor discover that the indicated route is not practically possible, or for some other reason the route clashes with other services, he shall immediately contact the engineer for clarification in this regard.

D. Ceiling space: Trunking for use as wireways shall be installed as specified on the drawings. When installed in open ceiling spaces, trunking shall be mounted as close as is physically possible to immediately below the apex of the roof to allow maximum working space. The trunking shall be

installed along the full length of the open ceiling space. Individual conduits shall be extended from the trunking to switch and socket outlet boxes, light points, distribution boards, etc.

The trunking shall be installed in one straight length and all joints shall be both electrically and mechanically continuous. The trunking shall only be installed where there is a minimum clearance of 750 mm as measured between the top of the final trunking installation and the underside of the roof sheeting. The trunking shall be securely fixed to every roof truss or member by means of round headed screws or approved truss clamps.

Both incoming and outgoing conduits shall be bonded to clean surfaces, both internally and externally, by means of two locknuts and a female brass bush. A solid brass bushnut installed from inside the trunking may also be used. Conduits which are extended from the trunking to outlets and power points shall be installed along roof members. Suitable timber or other supports shall be provided for free standing conduits extended from the trunking.

E. Suspending or fixing trunking against walls: The electrical contractor shall provide all the necessary hangers, supports, brackets and fixing hardware for the securing of the trunking installation.

Trunking up to and including 76 mm x 76 mm shall be supported at regular maximum spacings of 600 mm and larger channels at regular maximum spacings of 1 m. Trunking runs shall be carefully planned to prevent clashes with other services and to ensure that all covers can be easily removed after completion of the installation. Purpose made clamps and hangers shall be provided as required. Where however it is not possible to support the trunking at the specified spacings, such trunking sections shall be supported in a sound manner and to the approval of the engineer.

F. Cast in concrete: Where trunking is to be cast into concrete, the insert type of trunking shall be used. Spacer blocks shall be used where required to prevent the trunking from being deformed during the casting of the concrete.

The trunking shall be filled with polystyrene or other suitable fillers, prior to casting, to prevent the ingress of concrete. The trunking shall furthermore be securely fixed in position to the shuttering.

G. Conduit connections: Conduit connections shall be bonded to clean surfaces, both internally and externally, by means of either two locknuts and a female brass bush or by means of a solid brass nut inserted from the inside of the trunking. Conduit connections may be made by means of a conduit box if the trunking is wide enough to allow a hole to be punched through the back or side thereof. All holes through which conductors pass shall be fitted with bushes, grommets or shall be aligned with PVC strip grommet.

H. Joints and bends: Two adjoining lengths of trunking shall be aligned and shall be securely joined by means of fishplates fixed by means of mushroom bolts, washers and nuts. Alternatively connection pieces that are pop-riveted to both adjoining sections may be used. All adjoining lengths of trunking shall be rectangular and shall burr tightly. Special care shall be taken to ensure that the covers fit tightly across the joints.

Where the trunking passes through an expansion joint in the structure, suitable expansion joints shall be provided in the trunking by means of fishplates which are to be pop-riveted or screwed to the trunking on one side of the expansion joint and floating flecky, without obstruction in the trunking on the opposite side of the expansion joint.

Bends and T-joints shall be constructed to ensure compliance with the minimum allowable bending radii as specified in SANS 10142, in the case of PVC insulated cables and conductors.

All burrs and sharp edges shall be removed from the cut edges of the trunking and the inside edges shall be lined with a suitable rubberised or plastic compound to prevent laceration of the conductor insulation during installation.

I. Circuits: The conductors for each individual circuit, including the earth continuity conductor for that circuit, shall be grouped together at regular spacings not exceeding 500 mm by means of PVC cable ties or straps.

Each circuit to be installed inside the trunking shall be individually laid to avoid unnecessary tangling of the grouped conductor. The utilized cross sectional area of the trunking shall not normally exceed 50% of the total cross section of the specified trunking.

J. Earthing: A separate earth continuity conductor of size as specified in the detail specification shall be installed from the main earth bar or terminal to the trunking where it shall be terminated to ensure

a proper earthing of the trunking. The earth conductor shall be equipped with a crimped or soldered lug and shall be bolted to the wall of the trunking by means of a 6 mm Ø brass bolt, washers and nut.

K. Cover plates: Cover plates shall be installed over the full length of the installed trunking. Flush mounted trunking shall be provided with overlapping metal cover plates with plastic edge trim to cover irregularities in the wall recess. Where required and when specified, in the detail specification, cover plates shall be attached to the trunking by means of screws at suitable intervals to prevent warping.

L. Verminproofing: After installation all trunking shall be suitably verminproofed. Any holes present in the trunking shall be sealed by means of screwed metal plugs or else with metal strips which are tube-bolted or pop-riveted to the trunking. No timber or other temporary form of plug shall be accepted. Coverplates shall be installed over the full length of the trunking.

A7. TESTING

A7.1 INSTALLATION TESTS

Tests as stipulated in the "Occupational Health and Safety Act no. 85 of 1993, as amended, and in the "Code of Practice for the Wiring of Premises" SANS 10142 (as amended), must be done. Test report forms must be filled in fully and correctly in ink, signed by the installation electrician and handed to the Engineer or its representative.

Tests must be conducted on site after the whole installation is complete, unless the Engineer grants written permission to the contrary. The tests must include a full-load test for an adequate period to ensure the satisfactory working of the installation. If negative test results are obtained, faults must be rectified and tests again done.

The contractor must supply all testing apparatus, correctly calibrated.

All tests shall be carried out in conjunction with and to the satisfaction of the Supply Authority and in the presence of the Engineer or his representative. The contractor shall make all arrangements for testing and inspection, the costs thereof being included in the Tender Price.

Each length of cable shall be tested for insulation and polarity by means of a 1000 Volt Megger designed for that purpose. In the case of underground cables this shall be done before back filling. In addition, the earth-loop impedance of each conductor earth electrode shall be measured. The earth resistance shall be tested by means of an approved instrument.

"Danger" notices shall be displayed at remote ends of cables under test.

The contractor shall ensure that the installation is completed in every respect and that there are no major defects prior to notifying the Engineer (in writing) for a first delivery inspection. The Engineer will accept zero minor defects during the final inspection. Should the number of defects be exceeded at the final inspection then the Engineer will terminate that inspection and request that the contractor arrange an additional final inspection.

A7.2 SUBMITTALS

A. Submittals shall include, but not be limited to, the following:

1. Three (3) copies of certified test results for each test indicated herein, for approval and future references.
2. Certifications as required herein.
3. Additional information as required in the specifications.

A7.3 CONDUCTOR TESTS (600 Volts or less)

A. Prior to energizing of all new feeders, test all conductors for continuity of circuitry and for short circuits. No submittal is required for this test. Each wiring system with devices connected must test free from short circuits and grounds.

B. Each new feeder conductor shall have its insulation resistance tested after its installation is completed except for connection at its source and point of termination.

C. Test shall be made using a Megger or equivalent at a voltage of not less than 1000 VDC, and after one minute of operation at slip speed. Resistance shall be measured by connecting one terminal of the megger to the conductor and other terminal to earth. Reading shall be observed after 15 seconds of operation of the megger.

D. Conductors which do not meet or exceed the following insulation resistance values shall be removed, replaced, and retested.

E. Conductor test results shall indicate weather conditions, temperature, relative humidity, date and time, feeder tested, conductor size and type and resistance measurements.

A7.4 SERVICE SWITCHBOARD EARTH RESISTANCE TEST

A. Perform a earth resistance test on the switchboard earthing system for comparison of future inspection and testing data by the Owner. Overall system resistance shall not exceed 25 ohms. Eliminate any stray currents, shorts, or non-consistencies in the grounds system.

B. The test shall be performed using a Megger Earth Tester or equivalent test instrument and shall not be performed immediately following wet weather conditions.

C. Switchboard earth resistance test results shall indicate weather conditions for test, earthing system tested, earthing configuration and test results.

A7.5 EARTH FAULT PROTECTION SYSTEM TESTS

A. Factory test: The switchboard ground fault protection system shall be factory tested prior to shipment.

The switchboard manufacturer shall provide factory ground fault interlocking and protection system test for circuit testing, and verification of interlocking and tripping characteristics. The manufacturer shall pass predetermined values of current through the relay sensors, and measure the relay tripping time for each phase, and neutral. The measured time/current relationships shall be compared to the relay trip characteristics curves. If the relay trips outside the range of values indicated on the curve, the relay shall be replaced. This test shall include verification of polarity of the ground sensor circuits' interconnection.

B. Certified "factory test" results shall indicate relay number, device served, actual characteristic curves, design characteristic curves and overall test results.

C. Field test: Following completion of the construction and prior to final acceptance testing, the earth fault protection system shall be field tested and reset to the manufacturer's recommended setting for both time and current, by a representative of the Manufacturer. The field test shall be conducted in a similar manner to the factory test in that a cable from a low voltage, high-current test set shall be passed through each current sensor. This test shall also demonstrate the complete system reliability in that it must operate the associated shunt trips and show that the overcurrent devices which they operate will actually open.

D. Certified "field test" results shall indicate relay tested, relay settings, and test results.

A7.6 GENERATOR SYSTEM TESTS

A. Upon completion of installation of the electric generating system and after the building normal power source has been energized, test the package electric generating system to demonstrate

standby capability and compliance with specified requirements, including automatic start-up, controls, full load acceptance, and automatic shut-down.

B. Tests shall include operation of the standby electric power system with voltage check while the system is operating to ensure proper operation of the generator, transfer switches, and other system components.

C. Operation of the system shall simulate standby power conditions, that is, a simulated loss of main electrical power to the building with sufficient load available in the building systems or through the use of a portable load bank to sufficiently demonstrate packaged electric generating system. Test period shall be minimum of 2 hours continuous trouble free operation with at least 4 automatic transfer switch operations (each switch) within the period of operation.

D. Refer to specification 008: Generator systems for additional tests.

A7.7 SPECIAL TESTING

A. Certify in writing that the system operation is in accordance with specifications and code requirements.

A7.8 BALANCING OF ELECTRICAL CIRCUITS

A. The system of feeder and branch circuits for power and lighting shall be connected to distribution board bus-bars in such a manner that loads connected thereto will be balanced on all phases as close a practicable.

B. Should there be any unfavourable condition of unbalance on any part of the electrical system, the electrical contractor shall make such changes that may be necessary to remedy the unbalanced condition.

C. Prior to completion of the project, provide a complete list of all panels stating the measured loads on each phase. Test results shall indicate panels tested, amperage per phase, and any remedial action taken.

A7.9 OPERATIONAL TESTING

A. Take voltage and currents readings for each feeder and motor circuit under maximum operating conditions. Questionable readings shall be repeated at no cost for confirmation.

B. Controls for lighting and receptacle circuits shall be demonstrated.

C. Demonstrate running of motors with controls and interlocks.

D. Demonstrate operation of electrical equipment appliances.

A7.10 CABLES

Each cable shall be tested after installation in accordance with SANS 1507 (up to 1kV) and SANS 97 (up to 11kV) as well as the requirements of the local and supply authorities.

LV cables shall be tested by means of a suitable megger at 1kV and the insulation resistance shall be tabulated and certified.

MV cables shall be pressure tested in accordance with the manufacturer's recommendations and exact leakage current shall be tabulated and certified.

The contractor shall make all arrangements, pay all fees and provide all equipment for these tests. The cost of testing shall have been included in the tender price.

The contractor shall notify the Engineer and if applicable the Supply Authority timeously so that their representative may witness the tests.

On completion of the tests on any cable, the contractor shall without delay submit three (3) copies of the certified test results to the Engineer.

The contractor shall provide all the testing equipment as required for the respective tests.

A8. STREET AND AREA LIGHTING

A8.1 CODES AND STANDARDS

A. Codes and Standards: The Street and area lighting fixtures shall comply fully with the applicable SANS specifications as set out below and all equipment shall bear the mark of approval of the South African Bureau of Standards. The latest issue of:

- a) SANS 10225: The design and construction of lighting masts
- b) SANS 15607: Specification and qualification of welding procedures for metallic materials - General rules
- c) SANS 15609: Specification and qualification of welding procedures for metallic materials - Welding procedure specification Part 1: Arc welding
- d) SANS 62: Steel pipes Part 1: Pipes suitable for threading and of nominal size not exceeding 150 mm
- e) SANS 62: Steel pipes Part 2: Screwed pieces and pipe fittings of nominal size not exceeding 150 mm
- f) SANS 657: Steel tubes for non-pressure purposes Part 1: Sections for scaffolding, general engineering and structural applications
- g) SANS 121/ISO 1461: Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods
- h) SANS 10098-1: Public lighting Part 1: The lighting of public thoroughfares.
- i) SANS 10098-2: Public lighting Part 2: The lighting of certain specific areas of streets and highways
- j) ARP 035: Guidelines for the installation and maintenance of street lighting
- k) SANS 60598-1: Luminaires Part 1: General requirements and tests
- l) SANS 60598-2-3: Luminaires Part 2-3: Particular requirements - Luminaires for road and street lighting
- m) SANS 1088: Luminaire entries and spigots

B. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:

The manufacturer must be an ISO9001 certified company. Proof of certification is to be submitted together with the tender document, failing which the tender may be disregarded.

Products must carry the SABS mark or an international certification and approved for use in South Africa.

Installers must be certified or registered installers of the manufacturers or their representatives. Manufacturers or their representatives must also have registered offices in South Africa and the local office must carry sufficient stock and spare parts for the project.

A8.2 STREET LIGHTING

A. Street lighting to be manufactured to SANS specification and suitable for use as per SANS 10098.

The luminaires shall be delivered completely assembled with housing, ballast, photoelectric control unit, lighting management system and protector lens. Luminaires shall be Class 1 of IEC 60598-1 and be of the totally enclosed type. The luminaire output shall be provided as nominal flux at Tq of 35 °C.

The luminaires shall have minimum rating of IP 65 in accordance with SANS 60529 for both the light and ballast compartments, when normally mounted as per SANS 475.

A Street lighting Management system is to be incorporated as part as the street lighting installation. Contractors and suppliers are to ensure that the street lighting supplied is fully compatible with the street lighting management system supplied. The lights should be able to be controlled locally and remotely from a remote computer.

A8.3 CONSTRUCTION OF LUMINAIRES

A. The housing shall be robustly constructed, weatherproof, hail proof, insect proof, corrosion proof, ultraviolet light resistant and vandal resistant. Luminaires shall be suitable for operation at an ambient temperature, Ta, of 35°C. Fixing devices, junctions, lips and the like shall be designed to shed water. Pockets and ledges in which condensation may accumulate shall be avoided.

B. The luminaires shall be supplied with a built-in PECU capable of performing a minimum of 8 000 switching operations under full load, and shall be located in a position where it is least likely to be affected by luminaire heat.

C. LED luminaires shall contain a heat sink with no fans, pumps or liquids, and the design of the heat sink shall prevent the accumulation of dirt and nesting of insects or ants, thus ensuring effective heat dissipation.

D. The luminaires shall be constructed from light weight durable materials which for all parts shall be compatible and failure or deterioration shall not occur due to electrolytic action or by differential thermal expansion. Where glass reinforced polyester (GRP) is used it shall comply with the requirements of SANS 141 for Type F laminate products. Luminaires manufactured from polymeric material shall be ultraviolet stabilized. Luminaires shall have successfully passed the accelerated ageing test specified in SANS 60598.

E. Luminaires with aluminium housings shall be of grade LM 6 (EN1706 AC-44100) (or higher) aluminium alloy and shall comply with BS 1490. Bidders offering aluminium housings shall submit a metallurgical report from an independent metallurgist confirming the grade of aluminium for all the luminaires offered. The client reserves the right to submit luminaires for metallurgical testing when necessary.

F. Powder coated luminaires shall be light grey or white in colour. A powder coating that cracks as a result of corrosion of the aluminium base shall be considered a failure under warranty.

G. Ferrous components shall be hot-dip galvanised and shall withstand the test specified in the current edition of SANS 121 for heavy duty application.

H. Small components (such as toggle clips, bolts, screws, nuts, washers) shall be manufactured of stainless steel (grade 304 or better).

I. Due attention shall be paid to the accessibility of parts and to other requirements necessary for efficient maintenance and cleaning, where required. If screws are used to secure covers, they shall be held captive when opened.

J. The ballast or driver shall be mounted internally and be replaceable with the aid of commonly available hand tools.

K. The LED module or array shall be designed in such a way that the failure of one LED shall not cause additional LED's to switch-off.

A8.4 PROTECTOR LENS

A. The protector shall be resistant to heat and shall not discolour after prolonged exposure to the atmosphere or artificial light. Protectors manufactured from high-impact acrylic shall be ultra-violet stabilized. Bidders shall submit certified data regarding degradation of the material and depreciation of light transmission under working conditions, namely temperature and ultra-violet irradiation. Polycarbonate protectors are not acceptable. High-impact glass is the preferred material for the protector lens.

B. A protector, when fitted, shall form a seal preventing the entry of moisture, dust and insects into the lamp housing. A one-piece gasket shall be used for this purpose. The material of the gasket shall be a silicon sponge material and shall not deteriorate or suffer permanent deformation during the life of the luminaire. The gaskets shall not deteriorate due to light, heat or compression to which they will be exposed in practice and shall be screened against radiation from the light source.

C. The gasket shall be fitted into a groove in the housing and shall be kept in place by a tongue provided on the diffuser, thus ensuring the integrity of the IP65 rating. Further, the gaskets shall not work loose during maintenance of the luminaire.

A8.5 POWER SUPPLY OR DRIVER REQUIREMENTS

A. LED module(s) drivers shall be housed fully within the body of the luminaire and be suitable for operation with the specified rating of luminaire.

B. The output frequency of the drivers shall be 100 Hz or greater, to avoid visible flicker.

C. The harmonic distortion levels of the LED module driver(s) shall comply with the limits given in SANS 61000-3-2.

D. The LED module driver(s) shall operate at a power factor of 0,85 or greater, and the harmonic distortion levels shall be limited so as to not cause interference on the electrical network.

E. The power supply or driver compartment (containing the LED module driver) shall be sealed by a hinged non-corrosive, light-weight cover and shall be accessible from underneath. No components shall be mounted onto this cover. The cover shall be secured onto the fitting such that the provisions of clause 8.2 of IEC 60598 are met. Screws or bolts, if used, shall be held captive once loosened. Control gear shall be mounted on a removable gear-tray for ease of maintenance and not on the access door.

F. The power supply or driver compartment shall be so designed that there is sufficient space to permit repairs, replacement of components and reassembly without difficulty and without the removal of the luminaire from its mounting.

A8.6 EARTHING

A. The luminaire shall be earthed in accordance with Clause 13 of the Electrical Machinery Regulations of the OHS ACT (Act 85 of 1993).

B. Metal parts of luminaires which may become alive in the event of an insulation fault and which are not accessible when the luminaire is mounted but liable to come into contact with the supporting surface shall be permanently and reliably connected to an earthing terminal and shall withstand the test specified in IEC 60598-2-3.

C. Protection against electric shock shall be maintained for all methods and positions of installation in normal use. Protection shall also be maintained after removal of all parts which can be removed by hand, except those parts of lamp holders specified in SANS 60238.

D. Earthing terminals shall comply with sub-clause 7.2 of IEC 60598-1. All parts of an earth terminal shall be made of brass or other corrosion resistant metal and the contact surfaces shall be bare metal and not painted or varnished surfaces.

E. All earth connections shall be effected by means of suitable lugs appropriately made to avoid all possibility of electrolytic corrosion.

F. An earth connection shall be provided in all instances, even if the luminaire is fully insulated and even if all conductive parts, which could become alive in the event of an insulation fault, are not accessible. This is to facilitate future wiring should the luminaire be replaced by a unit which requires an earth connection.

A8.7 PHOTO-ELECTRIC CONTROL UNIT (PECU)

A. The luminaires or street lighting kiosk as per drawings shall be supplied with a PECU capable of performing a minimum of 8 000 switching operations under full load, and shall be located in a position where it is least likely to be affected by luminaire light.

B. The switch on photometric level of the PECU shall be at 25 lux \pm 10%.

C. The switch off photometric level of the PECU shall be at 15 lux \pm 10%.

D. The PECU shall be designed to fail to the "off" state of the switch.

E. The degree of protection provided to any part of a PECU which is open to the environment shall be at least IP 65 in accordance with SANS 60529.

F. All materials used in the manufacture of the PECU shall be UV stabilized in such a way that damage due to solar radiation will not cause the photometric performance of the PECU to deteriorate beyond the specified limits within a period of at least 10 years.

G. The change over switch shall be capable of switching 10 Amps alternating current at 230volts

H. The unit shall comprise a photo cell, thermal actuator and change-over switch. The cover of the unit shall be manufactured from a tough, durable material providing protection against tampering. The cover shall have good weathering properties. It shall be ultra violet resistant and shall not deteriorate when exposed to sunlight for prolonged periods.

I. The operation level shall be factory preset for "ON" and "OFF" at a light level as indicated. Voltage variations shall not materially affect the operational levels.

J. A time delay of not less than 15 seconds shall be provided to prevent the unit from functioning due to lightning or other short period changes in illumination.

K. The unit shall be effectively safeguarded against voltage surges by means of a suitable surge protector which shall preferably form an integral part of the unit.

L. The unit shall be of the two part, base and daylight switch type and shall be supplied complete.

A8.8 WIRING

A. The internal wiring of the luminaires shall be flexible and suitably insulated to withstand the voltage and the temperature encountered in service. Wiring colours shall be: live-brown (or red), neutral-blue (or black) and earth-green/yellow.

B. Wiring to the Light / LED module compartment shall be suitably grommited to prevent the ingress of insects into the light / LED module compartment.

4.9.3 The supply terminals shall accept 4mm² wires and be easily accessible. No part of the cover shall damage the supply wires when closed.

A8.9 STREETLIGHT LUMINAIRE MARKINGS

A. Each luminaire shall be distinctly marked with black writing on a white background using 25 mm high lettering on the outside of the control gear compartment, such that it is clearly visible from the ground, with the following information:

- a) Rated wattage of luminaire *and lamp type* in accordance with the description specified in Schedule A, e.g. 50 W LED; and
- b) The name of supplier followed by the luminaire model, e.g. SUPPLIER X, LUMINAIRE MODEL NAME.

B. Each luminaire shall bear the name or trade mark of the manufacturer and the date of manufacture

C. Luminaires delivered without the specified markings shall be rejected.

A8.10 STREET LIGHT LUMINAIRE PACKAGING

A. Each luminaire shall be delivered completely assembled ready for use and shall be individually packed in suitable containers such as cardboard boxes. The luminaires may be packed two per box. The containers shall be marked with appropriate description and stock code of the luminaire contained within.

A8.11 LUMINAIRE DOCUMENTATION

A. Full technical and descriptive details, relating to all the items offered shall be submitted so the offer can be fully evaluated. This shall include:

- a) Actual design data and results, and encrypted luminaire data files in an electronic format.
- b) Name of luminaire;
- c) The method of manufacture of the Luminaire;
- d) The dimension & weight of the Luminaire;
- e) The self cleaning properties of the Luminaire;
- f) The cooling mechanism of the Luminaire to adequately dissipate heat;
- g) Country of design, manufacture and assembly;
- h) Standards to which the luminaire conforms to (National & International);
- i) Specify life span of LED Module driver(s) or Power Supply

A8.12 STREETLIGHT LUMINAIRE SPARES

A. Bidders shall state their recommendations regarding the stocking of spare parts, which will be ordered at the discretion of the client and shall indicate whether such spare parts are available ex local stocks.

B. Any spare apparatus shall be subject to the same specification, tests and conditions as similar material supplied under the main contract.

A8.13 STREET LIGHT LUMINAIRE TEST REPORTS

A. Failure to provide test reports of the following tests called for may result in the rejection of the Bid:

- a) Type test according to IEC 60598-1:2004 and IEC 60598-2-3:2003.
- b) IP rating test reports for all items offered in accordance with SANS 60529.

B. A separate ambient temperature (Ta rating) test report shall be provided, in accordance with SANS 475.

C. The test reports shall be issued by SANS or IEC accredited test authority.

D. Bidders offering luminaires with aluminium housings shall submit a metallurgical report confirming the grade of aluminium.

E. Certified data from a recognised test authority regarding degradation of the material and depreciation of light transmission under working conditions, i.e. temperature and ultra-violet irradiation for the following:

- a) material of the body;
- b) material of the bowl; and
- c) material of the reflector.

The performance test reports which include the following:

- a) Photometric requirements;
- b) Static wind force test;
- c) External and internal wiring;
- d) Protection against electric shock;
- e) Thermal tests;
- f) Power factor;
- g) Resistance to corrosion;
- h) Insulation resistance and electric strength;
- i) Resistance to heat, fire and tracking; and
- j) Accelerated ageing tests.

F. An encrypted luminaire data file for each luminaire offered in an electronic format suitable for use with the Dialux Lighting Design Software package. The encrypted data file shall be produced by an accredited independent laboratory. This data file shall be supplied on a CD or flash drive with each bid.

G. Failure to submit such information may preclude further consideration of the bid.

A8.14 MATERIAL TESTING

Luminaires offered may be subjected to an accelerated aging test to evaluate the design and quality of materials used.

A8.15 TECHNICAL SPECIFICATION FOR STEEL STREET LIGHTING POLES

A. Scope: This specification details the manufacture, supply, delivery, off-loading and stacking of vertical street lighting poles as specified below and in the Bill of Quantities as depicted on drawings.

B. System and service conditions: The street lighting poles shall be for outdoor use in the area of installation and shall be suitable for conditions as set out in Section 0002: Design Criteria.

C. Design Data: The steel tubes shall comply fully with SANS 657: Part 1 except where amended herein. All items shall be manufactured from new materials.

The steel street lighting poles shall be designed to support one luminaire of unit mass of approximately 15 kg.

The steel street lighting poles shall be manufactured of grade 300W steel or equivalent, in accordance with SANS 657 with a minimum yield stress of 300 MPa and a minimum tensile strength of 450 MPa.

The steel street lighting poles shall be capable of withstanding a fluctuating wind load in accordance with the requirements of SANS 10225.

The maximum horizontal deflection at the spigot end, when subjected to two thirds of the design loading, shall not exceed 0,025 of the developed length above ground.

The maximum vertical deflection at the spigot end, when subjected to the mass of the luminaries shall not exceed 1,5 % of the total length of the pole.

Tenders must be accompanied by full technical details including comprehensive strength calculations certified by a qualified professional structural engineer.
Design wind speed: Terrain Category 2 with wind speed of 144km/ hour

D. Street lighting poles: The steel street lighting poles shall have minimum wall thicknesses as indicated on the drawings.

Protection sleeves shall be fully seal welded onto the steel street lighting poles. The dimensions of the protection sleeves shall be 600 mm long mild steel with a thickness of at least 3,5 mm and shall extend 300 mm above and below ground level.

Base plates, as per drawings shall be fitted to all steel street lighting poles.

A fuse box opening 300 mm long, 95 mm wide shall be provided 1000- 3000 mm above the ground line as indicated on the drawings. All edges are to be free from burrs and protrusions. The pole dimensions shown shall be increased to provide the required modulus of section or, alternatively, interior reinforcing shall be provided, should either of these requirements be necessary. A M6 stainless steel set screw (for earthing purposes) shall be fitted adjacent to the stud which is used to fasten the cover plate for the fuse box opening.

Alternative shapes of fuse - box openings may be considered but drawings showing full details of the proposed alternative arrangements shall be submitted with tender for approval.

E. Cover plate for fuse box opening: A curved mild steel cover plate of the same wall thickness as the steel pole shall be fitted to cover the fuse box opening. The cover plate shall be permanently attached to the pole by a fixing mechanism eg chain which shall be welded onto both the cover plate and pole. The plate shall be secured in the closed position by means of a M10 - 25 mm galvanized or stainless steel stud welded to the pole, and a unique heptagonal (seven-sided) M10 stainless steel or brass nut. Once the cover is secured to the pole the nut shall not protrude beyond the diameter of the pole, and it shall only be possible to remove the nut with the aid of a tube spanner. The tenderer shall submit a fully detailed working drawing of any alternative cover and fixing mechanism offered, eg for cover plates of UV stabilised, impact resistant plastic. Due to the prevalence of removal and theft of cover plates by vandals within the area of supply, preference will be given to designs whereby the cover plate sits flush with the exterior surface in order to prevent external leverage by means of tools and other implements.

The cover plate shall fit against the steel streetlight pole to give a flush exterior appearance. A one piece silicon gasket (approximately 2 mm thick) shall be provided for sealing the cover plate to the pole.

F. Cable access: For all steel street lighting poles, two 100 mm _ 65 mm slot shall be cut opposite one another at 90° to the fuse-box opening. The slots shall be well radiused and free of burrs.

G. Alternative Designs

Alternative designs of steel street lighting poles may be considered for acceptance provided that the poles are supplied in one piece.

For the alternative design, the tenderer shall submit with its tender, fully dimensioned drawings, and design calculations. These designs and calculations shall have been carried out by a qualified professional structural engineer. Documentary proof of compliance with this requirement will be required. It shall be required that the fuse box opening, cover plates, cable entries, protection sleeves, fins, spigots and joints be in accordance with the drawings submitted.

H. Welding: All welding shall be continuous and in compliance with SANS 15607/SANS 15609. All welds shall be dressed where necessary. No welded pieces (pipe reducers) shall be inserted in the poles. All joints shall be bevelled prior to welding and shall present a symmetrical appearance after welding.

I. Protection against Corrosion: Before galvanizing, all weld slag shall be removed from each pole by shot- or sand-blasting and a visual inspection shall be carried out to ensure the efficiency of this operation. All items shall be hot-dip galvanized in accordance with SANS ISO 121/ISO 1461.

No plugging at the ends of the poles during galvanizing shall be acceptable. The process used, shall comply completely with the requirements of SANS 121/ISO 1461 and the thickness of

galvanizing shall comply with the thickness laid down in that standard for the various diameters. Manufacturers shall produce certificates to the satisfaction of the Engineer with Methods and Standards showing that the specified thickness of galvanizing has been attained.

A8.16

A8.16.1 MARKING

A. The steel street lighting pole shall be clearly stamped, 50 mm below the fuse box cover plate, with 12 mm number and letter punches with the following:

- (a) the Contract number,
- (b) the manufacturer's name, and
- (c) the pole size.

B. The lettering and numbers shall be clearly visible after hot-dip galvanizing.

C. Alternative methods of marking poles may be considered provided that a full description of the marking process shall be submitted with the tender documents.

A8.16.2 INSPECTION

A. In addition to the requirements listed below, all poles shall comply with the test requirements of SANS 0225.

A8.16.3 PRIORITY OF WRITTEN SPECIFICATION

A. In the event of any disagreement between the written specification and the drawings, the written specification will take priority over the drawing(s).

A8.17 CONCRETE ENCASUREMENT OF SERVICES

A. Should the drawings or Bill of Quantities specify concrete encasement of services, the following is to be adhered to with regards to in-situ 20MPa Concrete Encasement of low voltage cables, sleeves for Low Voltage, ICT services and other future services.

The unit of measure shall be the length of concrete encasement constructed and finished. The concrete encasement shall be 250mm wide x 400mm deep for service sleeves and 300mm wide x 200mm deep for cables alone.

All LV and intermediate voltage cables shall be totally encased in concrete and enforced using bonding agent and chicken wire mesh.

Encasements shall be done in one meter sections. Service sleeves are laid into position; as per construction drawings as well as shuttering installed to obtain a class F1 surface finish. The concrete encasement will be constructed of standard 20MPa concrete with 19mm grade crush stone size.

Furthermore, cube tests shall be performed on the concrete and results submitted to the Engineer.

One set of cubes shall be submitted to the engineer for independent testing.

A8.18 SUBMITTALS

A. Shop drawings submittals shall include, but not be limited to, the following:

1. Cut sheets on all lighting fixtures with all accessories and details clearly indicated.
2. Cut sheets and complete technical data on ballasts, lamps, lens, poles, etc.
3. Photometric performance data.
4. Detailed information of the pole dimensions
5. Test reports and certificates of thickness of galvanising
6. Additional information as required.

A8.19 INSTALLATION

A. Mounting and installation of luminaires for street light and high mast lighting to be in accordance with the manufacturers recommendations. Due to the mounting height of the luminaires

A8.20 MOUNTING

A. Street light arms are inclined at 15° to the horizontal. If the luminaire offered is designed to be installed at 0° it shall have a mechanism to allow adjustment back to 0°. The luminaire shall be clearly marked with angles of inclination, and full details of how to adjust the angle of inclination shall be supplied. The angle of inclination must be clearly stated as this affects design data.

B. Luminaire entries shall be of a material that is inherently corrosion resistant and compatible with the galvanised mild steel supporting spigot to such a degree that deterioration by electrolytic action will not occur.

C. Spigot entries shall be designed to fit easily over the bracket pipe and shall be truly parallel to the fitting axis and shall comply with Table 1 of SANS 1088:1990 as follows:

a) For Type 2 luminaires (side entry), the inside diameter of the spigot entry shall be 50 mm to 55 mm.

D. The luminaire shall be secured on its spigot by at least two stainless steel M10 hexagonal-head screws as specified in ISO 4762. The construction of the housing shall be such that cracking cannot occur during the process of fixing the luminaire to the pole or bracket.

A8.21 GENERAL

The electrical subcontractor shall only commence with the installation of light poles or masts after the surrounding final civil finish level has been established or completed. The type of light fittings to be used are indicated and specified on both the relevant drawings as well as in the lighting schedule.

Positions of light fittings: The mounting positions of light fittings are indicated on the relevant drawings and shall be verified on site.

A8.22 GUARANTEE

A. All luminaires offered shall have a minimum guarantee period of five years. The scope of this guarantee includes the LED module drivers, luminaire housing, LED module(s), brackets, photoelectric control unit receptacle, protector lens. If luminaires are found to have failed within this period as a result of poor manufacturing processes and/or poor materials it shall be replaced free of charge by the manufacturer.

B. Luminaires bearing a date of manufacture exceeding four months prior to the date of delivery shall not be accepted.

A9.LV CABLES

A9.1 CODES AND STANDARDS

A. Codes and Standards: Cables supplied and installed shall comply with the following Acts and regulations:

1. The latest issue of SANS 10142-1: “Code of Practice for the Wiring of Premises-Part 1: Low Voltage Installations”,
2. The Occupational Health and Safety Act, 1993 (Act 85 of 1993) as amended,
3. The Local Government Ordinance 1939 (Ordinance 17 of 1939) as amended and the municipal by-laws and any special requirements of the local supply authority,
4. The Fire Brigade Services Act 1993, Act 99 of 1987 as amend,
5. The National Building Regulations and Building Standards Act 1977 (Act 103 of 1977) as emended,
6. The Post Office Act 1958 (Act 44 of 1958) as amended,
7. The Electricity Act 1984 (Act 41 of 1984) as amended,
8. The Regulations of the local Gas Board where applicable.

B. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:

The manufacturer must be an ISO9001 certified company. Proof of certification is to be submitted together with the tender document, failing which the tender may be disregarded.

Products must carry the SABS mark or an international certification and approved for use in South Africa.

Installers must be certified or registered installers of the manufacturers or their representatives. Manufacturers or their representatives must also have registered offices in South Africa and the local office must carry sufficient stock and spare parts for the project.

A9.2 SUBMITTALS

Shop drawing submittals shall include, but not be limited to, the following:

1. The Contractor shall submit to the Engineer for review, a list of the proposed manufacturers of cables, cable lugs, cable connectors, and termination fittings listed herein. The Contractor may install cable, cable lugs, cable connectors, joints and termination fittings furnished by any manufacturer listed on the approved submittal.
2. Cut sheets on all conductors with manufacturers name, ratings and capacities, insulation characteristics, and available colours, clearly listed.
3. Cut sheets indicating all cable lugs, termination fittings, joints and cable connectors.
4. Cut sheets indicating types of conductor identification bands.
5. Additional information as required in the specification.

A9.3 INSTALLATION - GENERAL

All cables laid directly in the ground shall be laid at a depth such that the vertical distance from the top of the cable to the finished ground surface is not less than the values given below:

Cables in open ground or under pedestrian paved areas	MV Cables	LV cables
Residential sites	800mm	450mm
Industrial sites	1000mm	500mm
Road Crossings	1100mm	1100mm
Railway crossings	1500mm	1500mm

Cables shall not be laid in the ground if any corrosive agent is found in the ground.

Before cable laying is commenced, all cable trenches shall be drained, the bottoms graded and compacted and all loose stones and similar debris removed.

Cable trench width for one or two cables shall be a maximum of 550mm. The width shall be increased as more cables are installed allowing for at least two cable diameter spacing for each cable added.

A9.4 HANDLING OF CABLE DRUMS ON SITE

Note: It is recommended that a correctly designed spreader must be used to load and unload the drums with a crane.

Every drum must be mounted on jacks or on a cable-drum trailer with a horizontal supporting beam of suitable size and strength to handle the width and weight of the drum. The drum may not be allowed to rotate freely when the cable is rolled off. (Free rotation causes the cable to twist and loosen the windings, which can cause the inside armouring/insulation of the cable to be stretched). The cable must enter the trench from the top of the reel. All cables ends including that left on the drum or in a trench must be sealed to prevent the penetration of moisture into the cable. The free cable end on the drum must be fastened to the side of the drum.

A9.5 CABLE LAYING

Cable rollers shall be used at all times to run out cables. Rollers shall be spaced so that the length of cable will be totally suspended during the laying operation.

Where cables have to be drawn through pipes or ducts, a suitable cable sock shall be used and care shall be exercised to avoid abrasion, elongation or distortion of any kind.

Where cables have to be drawn around corners, well lubricated securely fixed skid plates shall be used.

Cables shall be pulled into trenches etc, by hand or approved winch system only.

A9.6 SPACING OF CABLES

Cables installed in a common trench shall be laid parallel to each other spaced as follows:
(LV: up to 1000V; MV: 1000V to 11000V)

LV/LV	:	2 x cable diameters
LV/MV	:	300mm minimum

When MV and LV cables have to be installed in the same trench, the MV cable shall be laid on the one side of the trench at a depth as specified and covered with soil. The LV cable shall be then laid on the other side of the trench at the depth specified. Cables shall not be buried on top of each other unless layers are specified. The minimum spacing between layers shall be 200mm.

Cables for telephones, communication systems and other low voltage systems (less than 50V) shall be separated from power cables by at least 1000mm. All control or pilot cables shall be laid at least 300mm from power cables.

A9.7 INSTALLATION IN BUILDINGS

Particular attention shall be paid to the application of grouping factors in respect of current rating and the appropriate spacing of cables shall be allowed.

Cables for services above 650 volts shall be run separately from all other cables with a minimum clearance of 2300mm. cables for service below 100 volts including sound and telephone systems shall also be segregated from all other cables.

All cables shall be adequately supported throughout their length as specified by the Wiring Regulations or, where not specified as recommended by the cable manufacturers. No joints shall be allowed in cables of less than 300m length, unless as specified or specifically approved.

Cable run indoors shall be supported on cable trays or cable rack, secured thereto by heavy duty plastic strapping. The cables shall be fixed at intervals not greater than those stipulated in SANS 10142 and shall be spaced sufficiently to avoid de-rating in terms of SANS 10142 – 1. Cables shall be individually fixed so that any one may be removed from a group without disturbing the others. Every run of cable shall be a single length without joints. Save that where a run exceeds the general drum length of where the length of a run is increased after the cable is delivered on site, a through box will be permitted. Such through boxes shall be so placed as to afford easy access for maintenance and repair; when they are required in underground cable runs the contractor shall provide special cable markers to locate them. All cable tails shall be provided with either cable lugs or ferrules as may be appropriate. At each sealing end straps-on cable markers shall be fixed, showing clearly and indelibly the number and size of cable cores and the destination of the cable.

A9.8 CABLES IN CONCRETE TRENCHES

In concrete trenches, cables shall be laid side by side on the bottom of the trench without cross-overs. When necessary to maintain spacing factors, cables shall be fixed to the sides of the trench using cleats as specified for installation above floor level.

A9.9 CABLES IN DUCTS

The total cross sectional area of all cables installed in a duct shall not exceed 50% of the internal cross sectional area of the duct. After installation of the cables, duct stoppers shall be fitted to each end of each duct run and at the entry to the building to effectively seal the duct from ingress of vermin, etc.

A9.10 CABLE ROUTES

Cables shall follow the routes shown on the drawings; the routes shall only be varied with the written permission of the Engineer. Where no routes are defined on the drawings the contractor may select routes to his reasonable preference but shall obtain written approval of them before installing the cables.

The contractor shall, before trenching commences, familiarize himself with the routes and site conditions and the procedure and order of doing the work shall be planned in conjunction with the general construction program for other services and building requirements.

The contractor shall acquaint himself with the position of all the existing services such as storm water pipes, water mains, sewer mains, gas pipes, telephone cables, etc. before any excavations are commenced. For this purpose he shall approach the Engineer's representative, the local municipal authority and any other authority which may be involved, in writing.

The Engineer reserves the right to alter any cable route or portion thereof in advance of cable laying. Payment in respect of any additional or wasted work involved shall be at the documented rates.

The removal of obstructions along the cable routes shall be subject to the approval of the Engineer.

A9.11 CABLE JOINTS

Cable joints shall be carried out strictly in accordance with the manufacturers instruction and by personnel competent in jointing the cables involved.

No joints in cable runs will be allowed unless a cable run exceeds the maximum length available on a cable drum (normally 300m)

The joint shall not impair the characteristics of the cable.

Joints shall be fully water and air tight and shall be free of voids and air pockets

The crossing of cores in joints shall not be permitted under any circumstances.

The contractor shall notify the Engineer timeously of the day on which jointing is to be carried out in order that the inspection may be arranged if so required. Any cable joint not inspected by the

Engineer because of insufficient notice being given shall be opened for inspection and redone at the discretion of the Engineer and at the cost of the contractor.

A9.11.1 CONNECTION OF CABLE CORES

When cutting away insulation from cable cores to fit into lugs, care shall be taken that no strands are left exposed. Under no circumstances may any of the conductor strands be nicked or cut away to fit into lugs

Contact surfaces shall be thoroughly cleaned and smoothed and fixing bolts shall match the hole size of the lug.

Suitable lugs shall be crimped to cable core ends using mechanical or pneumatic tools designed for the purpose.

Cables that are connected to clamp type terminals where that clamping screws are not in direct contact with the conductor, need not be lugged but the correct terminal size shall be used.

Ferrules shall be used where cable cores are connected directly to equipment with screws against the conductor strands.

A9.12 TRENCHING

The contractor shall, before trenching commences, familiarise himself with the routes and site conditions. The procedure and order of doing the work shall be co-ordinated with the general construction programme.

Trenching shall be programmed in advance and the approved program shall not be departed from except with the consent of the Engineer.

The contractor will be held responsible for damage to any existing services brought to his attention by the relevant authorities and shall be responsible for the cost of repairs.

The contractor shall take all the necessary precautions and provide the necessary barriers, warning signs and/or lights to ensure that the public and/or employees on site are not endangered.

The contractor shall ensure that the excavations will not endanger existing structures, roads, railways, other site constructions or other property.

Trenches shall connect the points shown on the drawings in a straight line. The Engineer beforehand shall approve any deviations due to obstructions or existing services.

Trenches shall be as straight as possible and shall be excavated to a depth as indicated in this specification.

The excavated material shall be placed adjacent to each trench in such a manner as to prevent nuisance, interference or damage to adjacent drains, gateways, trenches, water furrows, other works, properties or traffic. Where this is not possible the excavated materials shall be removed from site and returned for back filling on completion of cable laying.

In the event of damage to other services or structures during trenching operations the contractor shall immediately notify the Engineer and institute repairs.

Prior to cable laying the trench shall be inspected thoroughly and all objects likely to cause damage to the cables either during or after laying shall be removed.

Where ground conditions are likely to reduce maximum current carrying capacities of cables or where the cables are likely to be subjected to chemical or other damage or electrolytic action, the Engineer shall be notified before installing the cables. The Engineer will advise on the course of action to be taken.

Extreme care shall be taken not to disturb surveyor's pegs. These pegs shall not be covered with excavated material. If the surveyor's pegs are disturbed, a person qualified to do so shall replace them.

The contractor shall ensure that the excavations will not endanger existing building structures, roads, railways, or other site construction or other property before excavating.

The contractor shall take all the necessary precautions and provide the necessary warning signs, barricades, shoring and/or lights to ensure that the public and /or personnel on site are not endangered.

Trenching crossing roads, footpaths or access ways shall not be left uncovered. If cables cannot be laid immediately, the contractor shall install sleeves or temporary “bridges” or cover plates, of sufficient strength to accommodate the traffic concerned.

The bottom of the trench shall be smooth and free of any sharp dips or rises which may cause tensile forces in the cable during backfilling.

The nature of the soil can be encountered is classified as follows:

- a) **Soft Soil:** Shall mean ground that can removed by pick and shovel and includes hand pickable soil that can be loosened by hand pick and includes hard shale, compact gravel stone and rocks up to 0.003 cubic meters in volume.
- b) **Soft rock:** Shall mean rock that can only be excavated by machine excavation and includes granite, quartzitic sandstone, slate and rock of similar or greater hardness, solid shale and boulders over 0.03 cubic meter in volume.
- c) **Hard Rock:** Shall mean rock that can only be excavated by explosives.

Should blasting be necessary, the contractor shall obtain all necessary authorities from the relevant departments and Local Authorities. The contractor shall take full responsibility and observe all conditions and regulations set forth by the above Authorities. The necessary insurance cover must be obtained to cover possible damage and losses.

Blasting shall be subject to the approval of the Engineer.

A9.13 CABLE SLEEVES

Where cables cross under roads, railway tracks, other service areas, etc and where cables enter buildings, the cables shall be installed in heavy duty uPVC pipes. The sleeves shall be heavy duty class 34 uPVC sleeving with a wall thickness of not less than 1,5mm thick and a smooth finish inside. Roads and railway crossings shall be done at right angles.

Sleeves shall be a minimum diameter as specified and shall extend at least 1,0m beyond the road edge or kerb on either side of the crossing.

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

Where sleeves have to be built into structures by others, the Contractor shall supply the sleeves and ensure that they are installed correctly.

A9.14 CABLE INSTALLATION AND BACK FILLING

The Contractor is responsible to ensure that the cable is installed at the depths specified, Cables depths indicated from finished ground level (FGL) must be installed accordingly. It is the Contractors responsibility to ensure that cable depths are measured from a finished final ground level. The contractor will be responsible to excavate and re-install the cable if this depth if not found to be correct.

Before the cable is laid into the trench, the bottom of the trench shall be filled across the full width with a 50mm layer of suitable sifted soil and levelled off. After cable laying, a further layer of bedding shall be provided to extend 50mm above the cables.

If there is no suitable soil available on site, the contractor shall import fill and make all the necessary arrangements to do so. The cost of importing soil for bedding purpose shall be included in the rates for excavations.

The bedding under joints shall be fully consolidated to prevent subsiding.

The contractor shall not commence with the back filling of trenches before the Engineer has inspected the cable installation. Should the Contractor fail to give timeous notification, the trenches shall be re-opened at the Contractor's cost. Such an inspection shall not be unreasonably delayed.

Cables (1000V to 11000V) shall be provided with a yellow coloured plastic marking tape installed 400mm above the cable. The tape shall be marked with a red skull and crossbones with the words "Electric Cable". This marking tape shall be installed over the entire length of the cable.

The maximum accepted diameter of stones present in the back fill material is 75mm.

The backfill shall be compacted in 150mm layers and sufficient allowance shall be made for final settlement. The contractor shall maintain the refilled trench at his expense for the duration of the contract. The surface shall be made good to the same density and to match the surrounding areas on completion.

In the case of road ways or paved areas, the excavations shall be consolidated to the original density of the surrounding material and the surface finish reinstated.

A9.15 CABLE MARKERS

Cable markers shall consist of concrete blocks dimensioned as follows:

300mm high, 150mm x 150mm and 250mm x 250mm at the bottom.

A stainless steel plate for labelling shall be cast into the tops of the blocks in such a manner that they cannot be prised loose. The wording as follows as well as arrows indicating cable direction shall be clearly stamped on the plates.

- For MV and LV cable routes: "ELECTRICAL CABLES"
- For joint positions: "ELECTRIC CABLE JOINT"

Cable markers shall be installed on the surface along all the underground routes and shall project 50mm above finished ground level. If the projected markers could be a hazard to pedestrians or other traffic, they shall be installed flush with the surface.

Cable markers shall be installed at all change in direction, at the beginning and the end of cable runs (i.e. where a cable enters a substation or building), above all joints, above cable pipe entries and exits and at intervals not exceeding 50m along the cable route. The position of cable markers shall be indicated on the "as built" drawings.

A9.16 TESTING - GENERAL

LV cables shall be tested by means of a suitable megger at 1kV and the insulation resistance shall be tabulated and certified.

The contractor shall make all arrangements, pay all fees and provide all equipment for these tests. The cost of testing shall have been included in the tender price.

The contractor shall notify the Engineer and if applicable the Supply Authority timeously so that their representative may witness the tests.

On completion of the tests on any cable, the contractor shall without delay submit three (3) copies of the certified test results to the Engineer.

The contractor shall provide all the testing equipment as required for the respective tests.

A10. SWITCHBOARDS AND DISTRIBUTION BOARDS

A10.1 CODES AND STANDARDS

A. Codes and Standards: Cables supplied and installed shall comply with the following Acts and regulations:

- a) The latest issue of SANS 556: “Low-voltage switchgear Part 1: Circuit-breakers
- b) The latest issue of SANS 1765: “Low-voltage switchgear and controlgear assemblies (distribution boards) with a rated short-circuit withstand strength up to and including 10 kA”
- c) The latest issue of SANS 60439: 1-5: “Low-voltage switchgear and controlgear assemblies”,
- d) The latest issue of SANS 60947: 1-8: “Low-voltage switchgear and controlgear”,
- e) The latest issue of SANS 1973: “Low-voltage switchgear and controlgear ASSEMBLIES Part 1-8”,
- a) The latest issue of NRS 003: “Metal-clad switchgear - For rated a.c. voltages above 1 kV and up to and including 24 kV Part 2: Standardized panels
- b) Codes and standards as per Section 002: Design Criteria.

B. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:

The manufacturer must be an ISO9001 certified company. Proof of certification is to be submitted together with the tender document, failing which the tender may be disregarded.

Products must carry the SABS mark or an international certification and approved for use in South Africa.

Installers must be certified or registered installers of the manufacturers or their representatives. Manufacturers or their representatives must also have registered offices in South Africa and the local office must carry sufficient stock and spare parts for the project.

A10.2 DISTRIBUTION SWITCHBOARDS

A. Distribution switchboards shall have construction with group mounted circuit protective devices and include the following:

1. Switchboard
2. Circuit Protective Devices

B. Switchboards shall consist of the required number of vertical sections bolted together to form one metal enclosed rigid switchboard for circuit protective devices and busbar work. Front and side plates shall be screw removable.

C. Switchboards shall be designed as freestanding switchgear with front only access or otherwise noted on the drawings. This switchgear shall be designed with group mounted devices and isolated busbars, expandable for future sections by the addition of simple splice plates on the horizontal busbar. An air space of at least 50mm or a minimum 3mm thickness insulating barrier shall be provided between end of bus bar and end panel. Switchboard shall be front and rear aligned to a common depth. Switchboard shall be of indoor switchboard construction.

D. The switchboard shall include all protective devices and equipment as shown with necessary interconnections, instrumentation, and control wiring. Small wiring, necessary fuse blocks, and terminal blocks within the switchboard shall be furnished. All groups of control wires leaving and switchboard shall be furnished with terminal blocks with suitable numbering strips. All wiring within switchboard enclosure shall utilize insulated copper conductors.

E. Enclosure Construction:

1. Switchboard framework shall be fabricated on a preformed steel base, or base assembly, consisting of a minimum of 1.6mm corrosion resistant mild steel and commercial channel welded or bolted together to rigidly support the entire shipping unit for moving on rollers and

floor mounting. The framework shall be formed of gauge mild steel, rigidly welded and bolted together to support all cover plates, busbars, and component devices during shipment and installation.

2. Each switchboard section shall have an open bottom and individually removable top plates for installation and termination of cables and conduit. Top and bottom conduit areas shall be clearly shown and dimensioned on the shop drawings. All closure plates shall be formed up on all sides, screw removable and small enough for easy handling by one man.

3. All steel surfaces shall be chemically cleaned and treated to provide a bond between paint and metal surfaces to prevent moisture entrance and rust formation under the paint film. The paint finish shall be two (2) coats of gray enamel over a rust-inhibiting phosphate primer. Baked enamel finish is acceptable if applied to properly prepared surface.

F. The switchboard shall be completely assembled, wired, adjusted and tested at the factory. After assembly, the complete switchboard will be tested for operation under simulated service conditions to assure the accuracy of the wiring and the functioning of all equipment. The main circuits shall be given a dielectric test of 2200 Volts for one minute between live parts and ground and between opposite polarities.

The wiring and controls shall be given a dielectric test of 1500 Volts for one minute between live parts and ground. A certified test report shall be available to the engineer for approval.

G. Busbars:

1. The switchboard busbars shall be 98% conductivity copper with bolted joint connections and of sufficient cross-sectional area to continuously conduct rated full load current with a maximum temperature rise of 65°C above an ambient temperature of 40°C. The switchboard shall have a full size, full length isolated neutral bus and a full-length copper earth bars.

2. The bus bars shall be rigidly braced to comply with the integrated equipment rating of the switchgear. The minimum interrupting current rating shall not be less than 65,000 AMPS symmetrical. The main horizontal bus bars between sections shall be located on the back of the switchboard to permit maximum available conduit area. Busbar supports shall be non-carbonizing, non-tracking insulators arranged to provide short circuit bracing as specified. All bolted joint hardware shall be equipped with lock washers and torqued to the Manufacturer's recommended settings. Bolted joint connection surfaces for copper busbars shall be silver plated.

Torque settings shall be provided for use during installation.

3. Busbars shall be arranged A-B-C, left-to-right, top-to-bottom, and front-to-rear, throughout. A ground busbar shall be secured to each vertical section structure and extend the entire length of the switchboard.

4. Where "space" is shown on one-line drawings, space shall be provided for installation of future switches, sized as shown.

5. Distribution feeder conductors shall be terminated on the "load side" of switchboard devices with hydraulically applied, high conductivity, compression lugs approved for the purpose. Where conductor connections are required to the main bus, they shall be made with copper bodied compression connectors.

H. Integrated Equipment Rating: Each switchboard, as a complete unit, shall be given a single integrated equipment rating by the manufacturer. The integrated equipment short-circuit rating shall certify that all equipment is capable of withstanding the stresses of a fault equal to that shown on the drawings, in RMS symmetrical amperes. Such ratings shall have been established by actual tests by the manufacturer, in equipment of similar construction as that of the project switchboard. This test data shall be available and furnished, if requested, with or before the submittal of shop drawings.

I. Electronic Power Monitoring System:

1. Each switchboard shall be provided with an electronic circuit monitoring system.
2. The Circuit Monitor shall accept inputs from industry standard instrument transformers. The current and voltage signals shall be digitally sampled at a rate high enough to provide accurate RMS sensing and valid data for wave form analysis beyond the 30th harmonic based on a fundamental frequency of the 50 Hz. All set-up parameters required by the Circuit Monitor shall be stored in non-volatile memory (no backup battery) and retained in event of a control power interruption. The instantaneous values and the time and date for the highest peak of all demand readings shall also be maintained in non-volatile memory.
3. The Circuit Monitor shall have capability to perform the following readings:
 - a. Current per Phase RMS ($\pm 1\%$).
 - b. Three Phase Average RMS Current ($\pm 1\%$).
 - c. Apparent RMS Current ($\pm 1\%$).
 - d. Phase-to-Phase and Phase-to-Neutral Voltage ($\pm 1\%$).
 - e. Three Phase and per Phase Power Factor ($\pm 2\%$).
 - f. Three Phase Real and Reactive Power ($\pm 2\%$).
 - g. Three Phase KVA ($\pm 2\%$).
 - h. Frequency ($\pm 0.5\%$).
 - i. Temperature ($\pm 2-1/2^{\circ}\text{C}$).
 - j. Average Demand Current per Phase ($\pm 2\%$).
 - k. Peak Demand Current per Phase ($\pm 2\%$).
 - l. Average Real Power Demand ($\pm 2\%$).
 - m. Predicted Real Power Demand ($\pm 2\%$).
 - n. Peak Real Power Demand ($\pm 2\%$).
 - o. Accumulated energy ($\pm 2\%$).
 - p. Accumulated reactive energy ($\pm 2\%$).
4. The Circuit Monitor waveform capture capability shall, upon user command, capture and store, in non-volatile memory, three phase voltage and current samples consisting of 256 data points each.

The data points shall represent at least three cycles of each current or voltage waveform. The samples shall be evenly gathered from each voltage and current phase input such that the original power signals with proper magnitude and phase relationships may be reconstructed. It shall be possible to recreate the original power signal from the stored data with sufficient accuracy such that steady-state power harmonic analysis will provide valid information on harmonic content up to the 30th harmonic.
5. All data and calculated values stored in the Circuit Monitor shall be accessible to external devices by means of a built-in RS485/RS422 serial communications port. It shall be possible to connect from one communication port to another such that up to 16 Circuit Monitors may be connected to form a continuous string extending up to 1000m. These strings shall form individual data transfer networks that comply with the RS485 multi-drop communications standards.

Communication rates for each circuit monitor shall be adjustable up to 19,200 Baud.
6. Circuit Monitors shall be installed by the switchboard manufacturer. All control power, CT, PT, and communications components shall be factory wired and harnessed within the switchboard line-up.

The Circuit Monitor shall be mounted on the front panel of the main switchboard incoming line compartment.

A10.3 SUBMITTALS

- A. Shop drawing submittals shall include, but not be limited to, the following:
 1. Switchboard shop drawings with all busbar and switch ratings, capacities, characteristics, features and associated accessories clearly indicated.

2. The minimum setting of the earth fault devices and the recommended setting for normal building operation.
3. Sufficient information to show that switchboard overcurrent protection devices have been fully coordinated with load side overcurrent protection devices and the Supply Authorities primary overcurrent protection. This shall include time/current curves and trip settings.
4. Equipment room layout showing switchboards, panelboards, motor control centres, etc., with required clearances as specified in the SANS codes.

A10.4 INSTALLATION

A. Install switchboard where shown, in accordance with the manufacturer's written instructions and recognized industry practices to ensure that the switchboards comply with the requirements and serve the intended purposes.

B. Install switchboard on a nominal 100 mm high reinforced concrete housekeeping pad. The housekeeping pad shall extend 80 mm beyond the housing of the switchboard unless shown otherwise. The entire assembled switchboard shall be anchored to continuous 40 mm x 150 mm channels for the full length.

The channels shall be embedded in the concrete housekeeping pad. Bolt studs shall be at least 10 mm in diameter and located not more than 750 mm apart centre to centre. The mounting channels shall be continuous single-piece structural channels and shall be levelled when embedded in the concrete housekeeping pads. The channel and bolt studs shall be furnished and installed by the Electrical Contractor.

A10.5 EQUIPMENT OF SWITCHBOARDS AND DISTRIBUTION KIOSKS

The fault-breaking capacity of each breaker shall be certified by IEC test to be not less than the prospective fault levels marked on the wiring schedules. When used as main L.T. switches protecting transformers, they shall be submitted to the Supply Authority for trip testing.

Moulded case circuit-breakers shall comply with IEC 157-1 or SANS 156:2007 as amended, shall be of fixed or draw-out execution as set out in the Project Specification. It shall have fault-breaking capacities certified by I.E.C. test to be equal to or greater than the prospective fault levels marked on the wiring schedules. Wherever possible, circuit breakers shall bear the SABS mark.

Miniature circuit-breakers shall comply with SANS 156:2007 as amended and shall bear the SABS mark. The fault-breaking capacity of miniature circuit breakers shall be certified by SABS test to be not less than the values set out in the wiring schedules.

Current-limiting circuit breakers, suitably certified, are acceptable in all cases.

In general circuit-breaker overload trip systems of the thermal or hydraulic-magnetic types are equally acceptable. In cases where high ambient temperatures or widely varying extremes of ambient temperature are expected hydraulic-magnetic devices shall be preferred: alternatively thermal devices with ambient temperature compensation may be offered. Where circuit breakers have to sustain motor-starting currents and the like, circuit breakers shall be hydraulic-magnetic with appropriate tripping characteristics. Where described in the Project Specification as being for short-circuit protection only, the circuit breakers shall be supplied without overload trip devices.

Switches shall comply with the requirements of SANS 60947 as amended and shall be capable of safely making onto fault currents of the magnitudes shown on the wiring schedules. Main switches of distribution boards shall additionally comply with the requirements of SANS 60947 applicable to switch-disconnectors. The main switches shall be rated for uninterrupted duty. Other switches shall be rated for 8-hour duty - the utilization category shall in all cases be AC22. All switches and switch-disconnectors shall bear the SABS mark.

Contactors shall comply with SANS 60947 and shall be rated to perform not less than 1 000 000 operations at the current ratings and duties quoted on the wiring schedules. They shall be so fixed as

to ensure adequate coil ventilation. Contactors shall comply with the detailed requirements set out later in this Specification.

The internal wiring of switchboards shall be done with colour-coded PVC-insulated stranded conductors and shall include all phase, neutral, earth and control wires between equipment and to terminal blocks. Wiring channels shall be made spacious enough to permit the easy passage of all circuit wiring with adequate spacing between different circuits to promote ventilation. All the wires of each circuit or sub-circuit shall be braided together with approved strapping and shall be so arranged as to permit any individual circuit to be examined or renewed without disturbing any other circuits. Stranded conductors shall be terminated in crimped lugs of ferrules; manual crimping shall be done with makers' special tools which will not release until the full crimping pressure has been achieved; the ends of conductors from 50mm² cross-sectional areas upwards shall be crimped by hydraulic machine.

A10.6 SPARE SPACE

All distribution boards shall be of adequate size to accommodate specified equipment and a minimum of 30% spare capacity shall be allowed for future equipment unless specifically stated in the detail specification.

A10.7 LABELS AND LEGENDS

All labels shall be of plastic "sandwich board" material, the legends being engraved through the front plastic layer to the contrasting inner layer.

The lettering of legends shall not be less than 6mm high in sans-serif capitals; white lettering on black ground or black lettering on white ground shall be selected as necessary to ensure maximum legibility and contrast with the switchboard finish. All labels shall be secured by at least two bolts or rivets per label and shall be accurately level and central over their subjects.

A10.8 BUSBARS

Bus bars shall be of copper or aluminium and shall comply with SANS 1195 as amended. Copper bus bars shall be tinned after fabrication; the current ratings shall be those assigned by the Copper Development Association. Multiple bars shall be arranged with air gaps between the sections, equal to the section thickness. Insulating busbar supports shall be provided at intervals related to the prospective short-circuit fault currents, the following table being a guide for single-section bus bars:

BUSBAR SECTION mm x mm	kA at 400 V FOR INSULATING SPACINGS OF			
	450mm	610mm	760mm	915mm
25 x 9,5	29	21	17	14
40 x 9,5	47	35	27	23
50 x 9,5	55	47	39	33
75 x 9,5	61	53	47	43
100 x 9,5	67	58	52	47

A10.9 COLOUR FINISH

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.
 UPS supply: Light Blue, colour of SANS 1091.

Refer to the DB schematic for details. The DB manufacture to supply three (3) x sets of drawings for approval prior to manufacture.

A10.10 RECESSED AND SEMI-RECESSED DISTRIBUTION BOARDS

A. Distribution boards shall consist of the following parts:

The bonding tray shall be constructed from 1,60 mm corrosion resistant mild sheet steel. Bracing gussets with cam-shaped slots shall be welded on the four corners. Knock-outs shall be provided in the upper and lower sides of the distribution boards. Expanded metal shall be spot-welded to the back of all bonding trays for 102,5 mm thick walls.

The architrave frame shall be constructed from 1,20 mm sheet steel with square edges.

The architrave frame shall form 25 mm border around bonding tray and shall be fixed to the tray in such a manner as to allow for adjustment for the inequalities in wall the finish.

A minimum of 75 mm shall be allowed between the inside of the architrave frame and the equipment. Distribution board numbers consisting of white engraved lettering on a black background shall be fixed to the top of the architrave frame.

Doors shall be constructed from 1,20 mm sheet steel, reinforced to ensure rigidity.

Doors shall be mounted flush in architrave frames. Door catches shall be constructed of chromium-plated brass and shall be mounted flush in the door. Built-in locks shall be provided when specified in the distribution board schedule.

The chassis shall be fixed to the architrave frame. The chassis shall be reinforced, with the necessary provision for fixing of the switchgear. A distance of 75 mm shall be allowed between rows of equipment. Panels shall be rigidly constructed from 1,6 mm sheet steel with machine-cut openings for flush mounted equipment. Panels shall be fixed to the architrave frame on studs with chromium plated hexagon dome headed nuts, or captive fasteners such that a clearance of 40 mm is maintained between panels and doors. Chromium-plated handles shall be supplied to facilitate removal of panels.

Busbars shall be of tinned HDHC solid copper with adequate cross-section and shall only be supplied if called for in the Schedules. Busbars are to be mounted on suitable isolators and shall be drilled and tapped.

Each distribution board shall be supplied with copper neutral and earth bars. Adequate terminals shall be provided.

Each busbar must be supplied with one larger terminal for the feeder cable.

Wiring shall be by means of PVC insulated conductors with sizes to suit the relevant switchgear. The ends of wires shall be provided with suitable lugs, firmly crimped or soldered for connection to busbars.

Wiring shall, where possible, be carried out in front of the chassis and shall be neatly bound in horizontal and vertical rows by means of approved plastic cable ties. Wiring shall be kept free of any current carrying parts.

Ends of wires which are connected to the clamps of miniature circuit breakers, shall be turned together firmly before insertion into terminals.

Finish: Welding joints and steelwork shall be ground smooth and free from blemishes.

Metal components of the framework, panels and chassis, shall be painted in accordance with the procedure detailed below. Baked enamel or electrostatically applied powder coating may be used.

1. Surface preparation: Prior to painting, all metal parts shall be thoroughly cleaned of rust, millscale, grease and foreign matter to a continuous metallic finish. Sand or shot blasting, or acid pickling and washing may be employed for this purpose.
2. Baked enamel finish: Immediately after cleaning all surfaces shall be covered by a rust inhibiting, tough, unbroken metal phosphate film and then thoroughly dried to SANS 10064. Within forty eight (48) hours after phosphating, a passivating layer consisting of a high quality zinc chromate primer shall be applied, followed by two (2) coats of high quality baked enamel to SANS 2808 Codes. The minimum paint thickness after baking shall be 0,6 mm. The paint shall have a shock resistance of 25 kg-cm on 0,9 mm soft steel plate and a scratch resistance of 2 kg.
3. Powder coated finish: Immediately after cleaning the metal parts shall be pre-heated and then covered by a micro structured paint powder applied electrostatically. The paint shall be baked on and shall harden within 10 minutes at a temperature of 190°C. The minimum paint thickness after baking shall be 0,05 m and the paint cover shall have a shock resistance of 25 kg-cm on 0,9 mm soft steel plate and a scratch resistance of 2 kg.

A10.11 SURFACE MOUNTED DISTRIBUTION BOARDS

Surface mounted distribution boards shall comply with SANS 60456 and shall be similar to the specification for flush mounted boards, except that the architrave frames and bonding trays are not required. In this case a box shall be supplied manufactured from 1,60 mm corrosion resistant sheet steel with knock-outs at the top and bottom for conduit entry. The board shall have a 25 mm wide frame around the flush mounted door, if required.

A10.12 TRAINING

A. Installation of the switchgear shall require no special tools. Product training shall be made available at the purchaser's facility if required.

A11. CONDUIT AND OUTLET BOXES

A11.1 CODES AND STANDARDS

A. Codes and Standards: 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.

- n) The latest issue of SANS 60614 and SANS 61035, parts 1 and 2: Metallic conduit and accessories
- o) The latest issue of SANS 950: Non-metallic conduit and accessories

B. Manufacturers: If they comply with these specifications and requirements, products of the following manufacturers will be acceptable:

The manufacturer must be an ISO9001 certified company. Proof of certification is to be submitted together with the tender document, failing which the tender may be disregarded.

Products must carry the SABS mark or an international certification and approved for use in South Africa.

Installers must be certified or registered installers of the manufacturers or their representatives. Manufacturers or their representatives must also have registered offices in South Africa and the local office must carry sufficient stock and spare parts for the project.

A11.2 CONDUIT AND ACCESSORIES

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 the particular specification.

Electrical and ICT distribution within buildings shall be as follows:

Cable trays – in open areas and accessible ceilings

Cable Baskets – in accessible ceilings

PVC Conduits – in accessible ceilings and hidden conduits

Galvanised steel conduits – exposed and surface mounted

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.

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.

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

Draw-boxes are to be provided in accordance with the “Wiring Code” and wherever necessary to facilitate easy wiring.

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 the particular specification or indicated on the drawings.

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

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.

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

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 Engineers 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.

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.

All conduit and accessories used in areas within 50 km of the coast shall be galvanised to SANS specifications.

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 Employer to any claim submitted by the Contractor, which may result from a lack of knowledge in regard to the supply authority’s requirements.

A11.3 SCREWED METALLIC CONDUIT AND ACCESSORIES

Screwed metallic conduits shall comply with SANS 60614 and shall bear the SABS mark. Screwed metallic conduits shall comprise of a heavy gauge, welded or solid drawn, black enamelled or hot-dipped galvanised, screwed steel tube.

Galvanised conduits shall be hot-dipped on both the inside and outside thereof, in accordance with SANS 121.

All conduit ends shall be reamed and threaded on both sides and shall be delivered to site with a steel coupling fitted at one end and a plastic screw on cap on the opposite end.

All screwed metallic conduit accessories shall be of malleable cast iron or pressed steel with brass bushes and all accessories shall be in accordance with SANS 60614 Part II. No alloy or pressure cast metal accessories or zinc base alloy fittings will be accepted.

All accessories whether galvanised or black enamelled shall be supplied with brass screws.

Locknuts are to be of the narrow, hexagonal type. Ring type lock nuts shall not be accepted except when used in round grouping boxes.

Bushnuts and male or female conduit bushes shall be manufactured from solid brass. Brass alloy bushnuts and bushes shall not be accepted.

In general screwed steel conduit shall be used in the wiring of buildings. The installation shall conform to requirements of SANS 10142. All joints in conduit tubing shall be red leaded to prevent rust. Galvanised conduit and accessories shall be used in the following circumstances and normally be electro-galvanised or cadmium plated:

- 1) In damp areas
- 2) In areas exposed to the weather
- 3) For all installations within 50 km of the coast. (These conduits and accessories shall be hot-dip galvanised to SANS 121).
- 4) In plenum chambers containing humidifying equipment.
- 5) For surface mounted conduit installations in kitchens and boiler rooms.
- 6) In screed resting directly on soil.
- 7) For connection points to future installations.
- 8) For underground conduit containing earthing conductors.
- 9) In buildings where animals are housed such as cattle, sheep, dogs, etc.

Screwed conduits shall be terminated by means of a brass female bush and two lock nuts in pressed steel switchboards and distribution boxes, cable ducts, power skirting, etc. The conduit end shall only project far enough through the hole to accommodate the bush and locknut.

A female bush and two lock nuts shall be used to terminate conduits at draw boxes and outlet boxes without spouts should there be sufficient room in the box. Where there is insufficient room, a coupling, brass male bush and locknut may be used with sufficient allowance for the reduction of the internal diameter by the male bush. Mechanical and electrical continuity shall be maintained throughout the conduit installation. The resistance of a completed joint shall not exceed 0,2 ohm. Under no circumstances shall conduit be relied upon for earth continuity

A11.4 PLAIN-END METALLIC CONDUIT AND ACCESSORIES

As an alternative to threaded metallic conduit, plain-end or unthreaded metallic conduit and accessories may be used. Plain-end conduit shall be manufactured from mild steel having a minimum wall thickness of 0,9 mm and shall comply with SANS 60614. Bending and setting of plain-end conduit shall be undertaken using the correct bending apparatus as recommended by the manufacturer of the conduit.

Galvanised conduits shall be hot-dipped on both the internal and external surfaces, in accordance with SANS 121. All plain-end metallic conduit accessories shall be of malleable cast iron or pressed steel and shall comply to SANS 60614.

Where specified plain-end conduit shall be installed. The following shall apply:

Bending and setting of plain-end conduit shall be done with special benders and apparatus manufactured for this purpose. Damaged conduit resulting from the use of incorrect bending apparatus shall be completely removed and rectified at the electrical contractor's expense.

A11.5 PVC CONDUIT AND ACCESSORIES

PVC conduit shall comply with SANS 950 and shall bear the SABS mark. PVC conduit shall be constructed from rigid PVC and shall be supplied in standard 4 metre lengths. PVC conduit shall be white in colour and shall be nonflammable. The minimum softening temperature shall be at 75°C.

All PVC conduit accessories shall be fully in accordance with SANS 950 and shall bear the SABS mark.

Where specified for a particular service, PVC conduit shall be installed.

All PVC conduit shall be installed in accordance with SANS 950. Insulated heat-resistant boxes shall be used for outlets of totally enclosed luminaires and other fittings where excessive temperatures are likely to occur. Luminaires and other fittings shall not be supported by PVC conduit of conduit boxes.

These fittings shall be secured to the surrounding structure in an acceptable way.

A11.6 FLEXIBLE CONDUIT

Flexible steel conduit and adaptors shall comply with BS 731, part 1 where applicable. Flexible steel conduit shall be of a galvanised steel construction which is not required to be waterproof, but shall be verminproof and suitable for protection of cables against mechanical damage. In moist or damp areas flexible steel conduit shall be of the plastic sheathed galvanised steel type. Flexible polypropylene tubing shall only be fastened to PVC conduit installations.

In installations where the equipment has to be moved frequently to enable adjustment during normal operation, for the connection of motors or any other vibrating equipment, for the connection of thermostats and sensors on equipment, for stove connection and where otherwise required, flexible conduit shall be used for the final connection to the equipment.

Flexible conduit shall be connected to the remainder of the installation by means of a draw box. The flexible conduit may be connected directly to the end of a conduit if an existing draw box is available within 2 m of the junction and if the flexible conduit can easily be rewired.

Flexible conduit shall consist of metal reinforced plastic conduit or PVC covered metal conduit with an internal diameter of at least 15 mm, unless approved to the contrary. In false ceiling voids, flexible conduit of galvanised steel constructions may be used. Connectors for coupling to the flexible conduit shall be of the gland or screw-in type, manufactured from either brass or mild steel plated with zinc or cadmium.

A11.7 EARTH CLAMPS

Earth clamps shall comprise of copper strips having a minimum thickness of 1 mm and shall not be less than 12 mm wide. Earth clamps shall be provided complete with a 25 mm x 4 mm brass bolt, washer and nut and shall be constructed so that the clip can be firmly attached to the conduit without the need for any additional packing.

A11.8 FLUSH MOUNTED STEEL WALL BOXES

Flush mounted steel wall boxes shall be manufactured from heavy gauge sheet steel and shall be galvanised. All wall boxes shall comply with SANS 1085. The boxes shall be provided with the necessary mounting lugs to suite the units for which the box is intended. Mounting highs shall be drilled and tapped at 82,5 mm centres suitable for fastening either flush mounted switch and socket outlet units. All fastening screws shall be provided with the box. Single gang wall boxes shall be approximately 500 mm wide by 100 mm long by 50 mm deep, with one knock-out at each end and at the back, and with two knock-outs on each side thereof. Double gang wall boxes shall be approximately 100 mm wide by 100 mm long by 50 mm deep, with two knock-outs on each end and with at least two knock-outs on the back, and on each side. All knock-outs are to be suitable for making-off 20 mm diameter conduits.

A11.9 FLUSH MOUNTED PVC WALL BOXES

Flush mounted PVC wall boxes shall be manufactured from rigid PVC and shall be white in colour. All PVC wall boxes shall comply with SANS 950. The boxes shall be provided with the necessary mounting lugs to suite the units for which the box is intended. Mounting lugs shall be drilled at 82,5mm centres and shall be provided with no 6 screw threads.

The boxes shall be of approximately the same physical dimensions as those specified for steel wall boxes and shall have 20 mm knock-outs. Facilities shall be provided for the fixing of earth terminals to the box.

A11.10 ROUND GROUP-TYPE STEEL BOXES

The boxes shall be manufactured in accordance with SANS 1085 where applicable. The boxes shall be of the long spout pattern and shall be constructed from either store enamelled jet black or galvanised steel, or from malleable cast iron. The two cover fixing holes shall be diagonally opposite each other, and shall be drilled and tapped at 50 mm centres. The internal dimensions shall be approximately 60 mm in diameter by 60 mm deep for use in concrete work. Shallower boxes shall be used in open roof spaces.

Threaded spouts shall be suitable for 20 mm diameter conduit. Round box covers shall be constructed from pressed enamelled or galvanised steel and shall be secured by using brass screws.

A11.11 ROUND GROUP-TYPE PVC BOXES.

The boxes shall be similar in shape to those specified for steel boxes and shall have spouts which are to be reinforced with webs. The cover screw pillars shall be provided with tapped brass inserts and provision shall be made for a brass earthing terminal adjacent to one or both of the pillars. PVC

round box covers shall be of PVC and shall be secured by means of 2 cadmium plated or brass screws at 50 mm centres. The boxes shall be fully in accordance with SANS 950.

A11.12 DRAW WIRES

All draw wires for unused conduits shall comprise of galvanised steel wire having a minimum diameter of 2 mm.

A11.13 INSTALLATION REQUIREMENTS

All accessories such as boxes for socket outlets, switches, lights, etc shall be accurately positioned. It is the responsibility of the electrical contractor to ensure that all accessories are installed level and square at the correct height from the floor, ceiling or roof level as specified. It shall be the responsibility of the electrical contractor to determine the correct final floor, ceiling and roof levels in conjunction with the principle contractor. Draw boxes shall not be installed in positions where they will be inaccessible after completion of the installation. Draw boxes shall be installed in inconspicuous positions to the approval of the engineer's representative and shall be indicated on the "as built" drawings. Galvanised steel draw wires shall be installed in all unwired conduit, e.g. conduits for future extensions, telephone installations and other services. The edge of flush mounted outlet boxes shall not be deeper than 10 mm from the final surface. Spacer springs shall be used under screws where necessary. Oversize cover plates shall be provided on all flush mounted round conduit boxes, where required. Surface mounted boxes shall be provided with standard size cover plate.

A11.14 INSTALLATION IN CONCRETE

In order not to delay building operations, the electrical subcontractor shall ensure that all conduits and accessories which are to be cast in concrete are placed in position in good time. The electrical contractor or his representative shall be in attendance when the concrete is cast. Draw boxes, expansion joints and round ceiling boxes shall be installed where required and shall be neatly finished to match the finished slab and wall surfaces. Ceiling draw boxes shall be of the deep type. In columns where flush mounted draw boxes are installed, the conduits shall be offset from the surface of the column immediately after leaving the draw box. Elbows for conduits of 32 mm dia and smaller and sharp bends will not be allowed in concrete slabs.

Draw boxes and/or inspection boxes shall, where possible, be grouped together under a common approved cover plate. The cover plate shall be secured by means of screws. All conduits shall be installed as close as possible to the neutral axis of concrete beams, slabs and columns. The conduits shall be rigidly secured to the reinforcing to prevent movement towards the surface of the concrete.

All conduits, draw boxes etc, shall be securely fixed to the shuttering to prevent displacement when concrete is cast. Draw boxes and outlet boxes shall preferably be secured by means of a bolt and nut installed from the back of the box through the shuttering. Fixing lugs may also be used to screw the boxes to the shuttering where off-shutter finishes are required. Where fibre glass shuttering is used by the builder, the equipment shall be fixed to the steel only and no holes shall be drilled or made in shuttering. All draw boxes and outlet boxes shall be plugged with wet paper before they are secured to the shuttering.

As far as possible, conduits shall not be installed across expansion joints. Where this is unavoidable a conduit expansion joint shall be provided. The expansion joint shall consist of two draw boxes with an interlinking flexible conduit connection. The draw box shall be installed adjacent to the expansion joint of the structure and a conduit sleeve, one size larger than that specified for the circuit, shall be provided on the side of the draw box nearest to the joint. The one end of the sleeve shall terminate at the edge of the joint and the other shall be secured to the draw box. The circuit conduit passing through the sleeve shall be terminated 40 mm inside the draw box and in the case of metallic conduit, the conduit end shall be fitted with a brass bush.

The gap between the sleeve and the conduit at the joint shall be sealed with a suitable and approved sealing compound, to prevent the ingress of wet cement. In the case of metallic conduit, an earth clip shall be fitted to the conduit projection inside the draw box and the conduit bonded to the box by means of 2,5 mm² bare copper earth wire and a brass bolt and nut. The other end of the circuit conduit shall be secured to the draw box by means of lock nuts and a brass bush in the case of

screwed metallic conduit or a standard bushed adaptor for other conduit types. In addition to an earth wire which may be specified for the circuit, a 2,5 mm² bare copper wire shall be provided between the first conduit box on either side of the joint in the case of metallic conduit. The conduit boxes shall be drilled and tapped and the earth wire shall be bonded to the boxes by means of lugs and brass screws. Suitable steel cover plates shall be screwed to draw boxes installed along the expansion joint. The cover plates shall be installed before the ceiling is painted. Where a number of conduits are installed in parallel they shall cross the expansion joint of the structure via a single draw box. A number of draw boxes adjacent to each other will not be allowed. The installation of conduits in floor screed shall be kept to a minimum. Where conduits are installed in screed, the top of the conduit shall be at least 20 mm below the surface of the screed. Where the screed is laid directly on the ground, galvanised conduits shall be used. A minimum distance of twice the outside diameter of the conduit shall be left free between adjoining conduits. Conduits shall be secured to the concrete slab at intervals not exceeding 2,0 m. The electrical contractor shall ensure that conduits are not visible above the screed where the conduits leave the screed. All draw boxes, conduits, etc, which are installed in concrete shall be cleaned with compressed air and provided with draw wires two days after removal of the shuttering.

Errors that occurred during the installation of the conduits, or any lost draw boxes, or blocked conduits shall be immediately reported to the engineer and confirmed in writing in order that an alternative route can be planned and approved by the engineer before the additional concrete is cast. Where it is necessary to cut or drill holes in the concrete structure, prior permission shall be obtained from the engineer in writing.

A11.15 INSTALLATION IN BRICKWORK

Recessed conduits and accessories installed in brickwork shall be built-in. In order not to delay building operations the electrical contractor shall ensure that all conduits and accessories which are to be built-in are placed in position in good time. Any conduits, draw boxes, outlet boxes etc, which have been damaged, lost or omitted shall immediately be reported to the engineer by telephone and confirmed in writing.

A11.16 CHASING AND BUILDER'S WORK

Except where otherwise specified the builder or principle contractor shall be responsible for building in of conduits, outlet boxes, switchboard trays, bonding trays and other wall outlet boxes. The electrical contractor shall notify the builder of his requirements and the responsibility lies with the electrical contractor to ensure that all builder's work is clearly indicated or marked where necessary and provided in accordance with his requirements.

Electrical materials to be built in must be supplied, placed and fixed in position by the electrical contractor when required to do so by the builder or principle contractor. The electrical contractor shall also ensure that these materials are installed in the correct positions.

Unless specifically stated to the contrary in the detail specification all flush mounted conduits, accessories, switchboard trays, bonding trays etc, shall be built-in and no chasing shall be allowed.

A11.17 MOUNTING HEIGHT OF DISTRIBUTION BOARDS, SWITCHES AND SOCKET OUTLETS

Except where stated otherwise, mounting heights shall be as follows:

Distribution boards: top frame 2000 mm above finished floor level

Switches: underside 1400 mm above finished floor level

Socket outlets: underside 300 mm above finished floor level

Telephone outlets: underside 300 mm above finished floor level

Power skirting: underside 100 mm above finished floor level

All distribution boards, switches and socket outlets shall be of the flush mounted type except where stated otherwise.

A11.18 POSITION OF OUTLETS, EQUIPMENT AND CONDUIT

Position of light outlets indicated on the plans are approximate. The exact positions of light outlets shall be determined with due regard to ceiling squares, branding and patterns. Where any doubt arises as to the correct location of outlets, the engineer and/or architect shall be consulted. The positions of other outlets, equipment and conduit are also approximate. The exact positions shall be determined on site in consultation with the engineer and/or architect.

A11.19 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 or conduit clips nailed to the roof timbers.

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.

All conduits shall be installed horizontally or vertically as determined by the route. The electrical contractor shall take all measures to ensure a neat installation. Conduits shall be firmly secured by means of saddles and screws and in accordance with SANS 10142. Conduits shall be secured within 150 mm before and after each 90o bend. Only approved plugging materials such as fibre plugs or plastic plugs, etc, and round head brass screws shall be used when fixing saddles, switches, plugs etc, to walls. Wood plugs are not acceptable nor should plugs be installed in joints in brick walls.

A11.20 SURFACE MOUNTED CONDUIT

Wherever possible, the conduit installation is to be concealed in the building work; however, where unavoidable or otherwise specified under the particular 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.

A11.21 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 Employer'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.

A11.22 WIRING

Except where otherwise specified in the particular 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 the particular 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 the particular 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 60227.

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.

A11.23 SWITCHES AND SOCKET OUTLETS

All switches and switch-socket outlet combination units shall conform to the Employer 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.

All switches, isolators and socket outlets shall be Lumex or Crabtree with plastic covers.

PART B: PARTICULAR SPECIFICATIONS

The work to be performed under this contract is in connection with the construction and erection of the electrical installation for Mpila Camp 2, **Imfolozi Game Reserve, St. Lucia Estuary, Kwazulu-Natal.**

B1. DETAILED SCOPE OF WORK

The following items entail the electrical scope of works for Umfolozi Game Reserve – Mpila Camp 2:

- Mains Power Supply and Site Reticulation
- Small Power
- Interior and Exterior Lighting
- Gas Installation

B1.1 MAINS POWER SUPPLY AND SITE RETICULATION

The main power to the proposed new areas of the site has been determined based on design loads. It was deemed that low voltage power be fed from an existing distribution board to a new 3Phase, 400V Kiosk. This kiosk will supply a main 3 phase, 400V distribution board which will provide power to 6x 1 phase 230V sub-distribution boards located in each unit. Refer to **001-013-ELE-002 6 Bed Staff Accom Unit Block A Electrical Layout Rev B**, **001-013-ELE-003 Electrical Site Plan Rev A** and **001-013-ELE-004 Block A & Block B Electrical Kiosk Schematic Layout Rev B.**

B1.2 SMALL POWER

Small power will consist of switched socket outlets and isolators at pre-determined positions. For location and type of equipment, refer to: **001-013-ELE-002 6 Bed Staff Accom Unit Block A&B Electrical Layout Rev B** and **Electrical Bill of Quantities.**

B1.3 INTERIOR AND EXTERIOR LIGHTING

All interior lighting and exterior lighting will be surface mounted at pre-determined locations. For location and type of equipment, refer to: **001-013-ELE-002 6 Bed Staff Accom Unit Block A&B Electrical Layout Rev B** and **Luminaire Schedule.**

B1.4 GAS INSTALLATION

Supply and Install 12 x Gas Geyser - 14 Litre, Bosch Battery/LPG (WRD 14B31). To include 800mm Flue pipe, powder coated outdoor weather cover and batteries. 19.7mm gas pipes to be installed in sleeves to 1 x Stove and 1 x Geyser per unit. Supply and install Cage for 8 x 48kg gas cylinders with lockable gate. Floor mounted Refer to **001-013-ELE-003 Electrical Site Plan Rev A.**

The gas installation is to be supplied, installed and commissioned by a qualified and certified SAQCC gas installation specialist. A Gas Installation Certificate of Compliance (Gas CoC) must be provided and signed by a registered installer.

The central Gas cage is to house 8 x 48kg gas cylinders with 4 x cylinders per Block (2 in use and 2 spare). A header pipe with the required isolation valves to be provided per block inside the gas cage.





B2. DRAWING SCHEDULE

The following drawings are part of the tender and should be priced accordingly.

Drawing No.	Title
001-013-ELE-002	6 Bed Staff Accom Unit Block A&B Electrical Layout Rev D
001-013-ELE-003	Electrical Site Plan Rev A
001-013-ELE-004	Block A & Block B Electrical Kiosk Schematic Layout Rev B

B3. LUMINAIRE SCHEDULE

LUMINAIRE SCHEDULE

TYPE	WATT (Approx)	Quantities	Location	DESCRIPTION (Similar or Equivalent)	Images
C	Ceiling Lights				
C1	1X15W	6	Bedrooms	Surface mounted ceiling luminaire, with die cast aluminium housing and matt acrylic diffuser.CFL lamp. To include lamps and all necessary mounting accessories. Minimum IP 44.Insect proof.	
C2	1X15W	6	Toilets	Surface mounted bowl and gallery ceiling luminaire with CFL lamp. To include lamps and all necessary mounting accessories. Minimum IP 44. Insect Proof.	
C3	1X15W	6	Veranda	Surface mounted wall luminaire, with die cast aluminium housing and clear acrylic diffuser.CFL lamp. To include lamps and all necessary mounting accessories. Including intergrated daylight switch. Minimum IP 44. Insect proof.	
C4	2X32W	6	Living Room	1200mm Surface mounted luminaire. T5 fluorescent lamps. Polycarbonate body, clear polycarbonate diffuser, to include lamps, cover clips , electronic control gear and all necessary accessories.Minimum IP 44.Insect proof.	

**NEW 2 X 6 BED STAFF ACCOMMODATION UNITS
AT MPILA CAMP IMFOLOZI GAME RESERVE**



**PART D2.3:
GEOTECHNICAL REPORT**

REPORT

DETAILING THE FINDINGS OF A SHALLOW

GEOTECHNICAL INVESTIGATION

FOR THE PROPOSED NEW

STAFF QUARTERS – MPILA CAMP, HLUHLUWE

BY

PM GEOTECHNICAL

FOR

MR RESHAY TAKOORDEEN

Date: 17th March 2021

Ref No.: EQ 2124

Index

1. Introduction
2. Site Description
3. Method of Investigation
4. Information Supplied
5. Findings of Investigation
6. Conclusions

Appendices:

- Appendix A
 - Auger Hole Logs
- Appendix B
 - DCP Results
- Appendix C
 - Site Plan

1. Introduction:

This report details the findings of a shallow Geotechnical Investigation undertaken on the site of the proposed new Staff Quarters, at the Mpila Camp in the Hluhluwe iMfolozi Game Reserve, Kwa-zulu Natal. The investigation was requested by Mr Reshay Takoordeen of ART Consulting Enterprise (Pty) Ltd.

The purpose of the investigation is for the following:

- To determine the in-situ nature and engineering properties of the upper soil strata underlying the site
- To present comments on the use of the on-site soils in the construction of bulk fill terraces, access roads, and parking areas
- To comment on any other geotechnical aspects that may affect the development

The subsequent findings and recommendations are reported on below.

2. Site Description

The site is located in the Hluhluwe iMfolozi Game Reserve, Kwa-zulu Natal. The site is currently being used as staff quarters, however they are in need of replacement. The site is generally bare, with minor patches of grass and shrubs.



Image showing the approximate site boundaries.

3. Method of Investigation:

The in situ Dynamic Cone Penetration (DCP) Test comprises the recording of the penetration of a 60° cone driven into the ground using an 8kG hammer falling a distance of 575mm, this has been recorded as blows per 100mm. The results of these tests are attached with this report.

A handheld auger was used to excavate the Auger Holes (AH's). The termination of the holes was based on refusal of the auger. The Auger Holes (AH's) were logged and recorded, these logs are shown in Appendix A.

Existing soil profiles were also logged and recorded.

4. Information Supplied

The location of the site as well as site plans were provided by Mr Reshay Takoordeen.

5. Findings of the investigation

The site is underlain by colluvial soils derived from the Vryheid Formation Sandstones and Shales as well as the Jurassic Dolerites. Dolerite and Sandstone boulders were observed within the upper soils around the site.

No groundwater seepage was observed during the investigation, the investigation was undertaken after a period with little rainfall, in the wetter months or after periods of extended rainfall, standing areas of water may become an issue, drainage will need to be installed to prevent this becoming an issue.



Image showing shallow rock on site.

Generally the subsurface comprised the following profile:

0 – 0.3m: *Dry, greyish brown speckled grey, intact, firm, SANDY CLAY with cobbles and boulders.
(Colluvium)*

0.3m – 0.5m: *Slightly moist, yellow brown to orange brown streaked dark brown, hard, SANDY CLAY.
(Residual Sandstone / Shale / Dolerite)*

In terms of SANS 1200 excavation classifications, soft excavations can be expected to depths of up to 0.5m below EGL with the potential for boulder excavation in places as well as hard excavation below 0.5m. Soft excavation implies that the material can easily be removed by conventional excavation plant.

6. Conclusions:

- a) From the observations on site and the field tests, it is recommended that batters be kept at a 1:1 slope, however excavation to depths that require battering and shoring is not anticipated.
- b) In terms of general foundations for the proposed structures, it has been deemed that podded / waffle rafts will suffice to carry the loads of the proposed buildings. The soils are highly variable across the site, and with such variability, differential settlement is a risk, and thus a raft foundation will be able to negate the potential for differential settlement. The bearing capacities of the soils range from 100kPa in the upper firm colluvial topsoil, up to 300kPa in the weathered sandstone and shale. Pebbles, cobbles and boulders were observed during the investigation, if found during the excavation of the foundations, the boulders and larger cobbles will need to be removed if found below a proposed structure to prevent differential settlement.

Stub piles would also be an option for the proposed developments, however the piles will need to be socketed into the competent layers, to provide friction against uplift created by heave in the residual dolerite soils. Pile design should be undertaken by experienced pile designer.

Pile Load Table (kN)							
Diameter	Shaft Stress (MPa)						
	4	4.5	5	5.5	6	6.5	7
250	197	221	246	270	295	319	344
300	283	318	354	389	424	460	495
350	385	433	481	529	577	626	674
400	503	566	628	691	754	817	880
450	636	716	795	875	954	1034	1113
600	1131	1272	1413	1555	1696	1837	1979

- c) In the area of the proposed water tanks, mass concrete footings founded on the bedrock material will suffice to support the loads.



P. Moller
Engineering Geologist



Frans Visser
Geotechnical Engineer

APPENDIX A – AUGER HOLE LOGS

IP Number:	AH1	Date Logged	05/10/2020
Logged by:	P Moller		
Depth (m)	Description		
0	Dry, greyish brown speckled grey, intact, firm, SANDY CLAY with cobbles and boulders. (Colluvium)		
0.1			
0.2			
0.3	0.3m		
0.4			
0.5	<i>W5/4, yellow grey blotched dark grey, completely weathered,</i>		
0.6	close jointing, extremely soft to very soft rock Shale (Vryheid Formation)		
0.7	0.4m		
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

IP Number:		AH2	Date Logged	12/03/2021
Logged by:		P Moller		
Depth (m)	Description			
0	Dry, greyish brown speckled grey, intact, firm, SANDY CLAY with cobbles and boulders. (Colluvium)			
0.1				
0.2				
0.3				0.3m
0.4				
0.5	<i>W5/4, yellow grey blotched orange brown, completely weathered,</i> medium jointing, extremely soft to very soft rock SANDSTONE. (Vryheid Formation)			
0.6				
0.7				0.4m
0.8				
0.9				
1				
1.1				
1.2				
1.3				
1.4				
1.5				
1.6				
1.7				
1.8				
1.9				
2				
2.1				
2.2				
2.3				
2.4				
2.5				
2.6				
2.7				
2.8				
2.9				
3				
3.1				
3.2				
3.3				
3.4				
3.5				
3.6				
3.7				
3.8				
3.9				
4				

IP Number:	AH3	Date Logged	12/03/2021
Logged by:	P Moller		
Depth (m)	Description		
0	Dry, greyish brown speckled grey, intact, firm, SANDY CLAY with cobbles and boulders. (Colluvium)		
0.1			
0.2			
0.3	0.3m		
0.4			
0.5	<i>W5/4, yellow grey blotched orange brown, completely weathered,</i>		
0.6	medium jointing, extremely soft to very soft rock SANDSTONE. (Vryheid Formation)		
0.7	0.4m		
0.8			
0.9			
1			
1.1			
1.2			
1.3			
1.4			
1.5			
1.6			
1.7			
1.8			
1.9			
2			
2.1			
2.2			
2.3			
2.4			
2.5			
2.6			
2.7			
2.8			
2.9			
3			
3.1			
3.2			
3.3			
3.4			
3.5			
3.6			
3.7			
3.8			
3.9			
4			

APPENDIX B – DCP RESULTS

APPENDIX C – SITE PLAN SHOWING TEST POSITIONS

