



TENDER COVER PAGE



MBD 1

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF JOHANNESBURG WATER

BID NUMBER: JW14452

CLOSING DATE: 17 FEBRUARY 2025

CLOSING TIME: 10:30 AM

DESCRIPTION: BUILDING UPGRADE FOR THE MEGA WAREHOUSE IN LANGLAAGTE DEPOT

CIDB REQUIREMENTS: TENDERERS SHOULD HAVE A CONTRACTOR CIDB GRADING OF 7GB OR HIGHER

BRIEFING SESSION	COMPLUSORY YES
BRIEFING DETAILS	DATE AND TIME : 22 JANUARY 2025 AT 13:00 ADDRESS : 2 LINK ROAD IN LANGLAAGTE, JOHANNESBURG VENUE : 2 LINK ROAD IN LANGLAAGTE, JOHANNESBURG, WORKSHOP IN LANGLAAGTE DEPOT <i>Note:</i> <i>For offsite briefing attendees to ensure that transport used is capable to access the gravel road for site viewing.</i>
TENDER SUBMISSION DETAILS	BID DOCUMENTS MUST BE DEPOSITED IN THE TENDER BOX SITUATED AT GROUND FLOOR IN JOHANNESBURG WATER ADDRESS: TURBINE HALL, 65 NTEMI PILISO STREET, NEWTOWN, JOHANNESBURG, 2001 PLEASE ALLOW SUFFICIENT TIME TO ACCESS JOHANNESBURG WATER OFFICES IN TURBINE HALL AND DEPOSIT YOUR TENDER DOCUMENT IN THE JOHANNESBURG WATER TENDER BOX SITUATED AT RECEPTION BEFORE TENDER CLOSING TIME. TIMES: THE BUILDING WILL OPEN 7 DAYS A WEEK FROM 06:00 UNTIL 18:00

BIDDER INFORMATION				
NAME OF BIDDER				
NO. OF DOCUMENTS SUBMITTED				
PHYSICAL ADDRESS				
TELEPHONE NUMBER				
CELLPHONE NUMBER				
E-MAIL ADDRESS				
VAT REGISTRATION NUMBER				
TAX COMPLIANCE STATUS	TCS PIN		MAAA No	
OTHER STATUS	COIDA Registration No		CIDB (CRS) No	

EMPLOYER INFORMATION			
DEPARTMENT	CAPEX	DEPARTMENT	SCM
CONTACT PERSON	Tshilidzi Tshikovhi	CONTACT PERSON	GCINA NDELA
TELEPHONE NUMBER	011 688 1686	TELEPHONE NUMBER	011 688 1796
E-MAIL ADDRESS	tshilidzi.tshikovhi@jwater.co.za	E-MAIL ADDRESS	gcina.ndela@jwater.co.za



**TENDER COVER PAGE
PART B
TERMS AND CONDITIONS FOR BIDDING**

1. BID SUBMISSION:

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

2. TAX COMPLIANCE REQUIREMENTS

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

3. QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

- 3.1. IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)?
☐ YES ☐ NO
- 3.2. DOES THE ENTITY HAVE A BRANCH IN THE RSA?
☐ YES ☐ NO
- 3.3. DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA?
☐ YES ☐ NO
- 3.4. DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA?
☐ YES ☐ NO
- 3.5. IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION?
☐ YES ☐ NO

IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 ABOVE.

NB: FAILURE TO PROVIDE ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID



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WITHOUT LIMITATION, JOHANNESBURG WATER TAKES NO RESPONSIBILITY FOR ANY DELAYS IN ANY COURIER OR POSTAL SYSTEM OR ANY LOGISTICAL DELAYS WITHIN THE PREMISES OF JOHANNESBURG WATER. JOHANNESBURG WATER LIKEWISE TAKES NO RESPONSIBILITY FOR OFFERS DELIVERED TO A LOCATION OTHER THAN THE TENDER BOX AS PER THE TENDER SUBMISSION DETAILS STATED IN THE TENDER DOCUMENT. PROOF OF POSTING OR OF COURIER DELIVERY WILL NOT BE TAKEN BY JOHANNESBURG WATER AS PROOF OF DELIVERY. TENDER SUBMISSION DOCUMENTS MUST BE IN THE BOX BEFORE TENDER CLOSURE.

The Johannesburg Water Supply Chain Management policy at time of tender advert is applicable to this tender and is available on the JW website www.johannesburgwater.co.za

THE TENDERER IS ENCOURAGED TO SIGN THE TENDER SUBMISSION REGISTER WHEN SUBMITTING THEIR TENDERS.

PLEASE ENSURE YOU SUBMIT 1 x ORIGINAL TENDER HARD DOCUMENT
(ALSO PROVIDE AN ELECTRONIC COPY IN A MEMORY STICK/USB).

Any documents required that are not submitted in the tender box at the deadline will be considered late.

The tenderer accepts that Johannesburg Water will not take responsibility for the misplacement or premature opening of the tender if the outer package is not sealed and marked as stated.

NB: NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE.

NAME OF CONTACT PERSON:

SIGNATURE OF BIDDER:

CAPACITY UNDER WHICH THIS BID IS SIGNED:

DATE:



TENDER NOTICE AND INVITATION TO TENDER



1. TENDER NOTICE AND INVITATION TO TENDER

Johannesburg Water (SOC) Ltd invites the tenderer for the following:

CONTRACT NO. JW14452: BUILDING UPGRADE FOR MEGA STORE WAREHOUSE IN LANGLAAGTE

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

The Employer is Johannesburg Water

All tenders and supporting documents must be submitted in a sealed envelope and be placed in the Tender box on the ground floor of the Johannesburg Water by no later than 10:30 am on 17 February 2025.

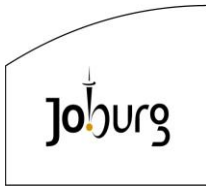
Address is as follows:

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

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

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

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



Contract No JW 14452
BUILDING UPGRADE FOR THE
MEGA WAREHOUSE IN LANGLAAGTE DEPOT
Volume 1 Tender and Contract
Section T1 Tender and Contract



Johannesburg Water SOC Ltd



CONTRACT NO: JW14452

**BUILDING UPGRADE FOR THE MEGA WAREHOUSE IN
LANGLAAGTE DEPOT**

VOLUME 1

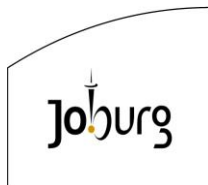
TENDER AND CONTRACT

Prepared by
PMU
PO Box 61542
Marshalltown
2107

V2.0
August 2023



Employer:		Contractor:	
Witness:		Witness:	



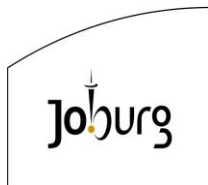
The Tenderer is to indicate in the “Submitted (Yes/No)” column in the below table that they have completed the required section of the tender document. Completion of this checklist will assist the Tenderer in ensuring that they have attended to all the required items for submission with this tender.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

All documentation listed in the Checklist below shall form part of the Contract.

Table 1

Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
1.	Tender Cover:				
	Name of Tender	•			
	Contact Person	•			
	Telephone Number	•			
	Central Supplier Database Registration	•	•		
	CIDB Registration Number, minimum required CIDB grading for the tender and Active Status – if applicable	•			
	COIDA Registration Number			•	
	Tax SARS PIN No.	•	•		
	MAAA No. for Tax Compliant Status	•	•		
2.	Mandatory Documents at Particular Stage:				
	CIDB grading of 7GB or higher. Active Status at the required CIDB grading or higher at the time of Evaluation	•			
	Mandatory Tender Briefing Meeting	•			
	Complete and sign the Form of Offer	•			
	Complete and sign BOQ and Summary	•			
3. T2.1	Administrative Documentation:				
	Signed Certificate of Authority to Sign	•			
	MBD 1 - Invitation to Bid - Completed and signed	•	•		
	Central Supplier Database Registration	•			
	MBD 4 - Declaration of interest - Completed and signed	•	•		
T2.2.4	MBD 5 - Declaration for procurement above R10 Million (all applicable taxes included) Completed and signed.	•	•		

Employer:		Contractor:	
Witness:		Witness:	

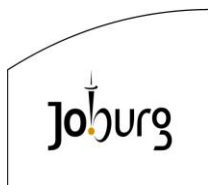


Contract No JW 14452
BUILDING UPGRADE FOR THE
MEGA WAREHOUSE IN LANGLAAGTE DEPOT
Volume 1 Tender and Contract
Section T1 Tender and Contract



Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
	MBD 6.1 - Preference Points Schedule – Specific Goals and Price Points - Completed and signed.	•			
T2.2.4	MBD 8 - Bidder's past supply chain management practices – Completed and signed.	•	•		
T2.2.4	MBD 9 - Certificate of Independent Bid Determination – Completed and signed.	•	•		
	Municipal Rates and Taxes for the Tenderer - Current municipal rates for the company not older than 90 days (if leasing/renting, submitted proof such as lease agreement where premises are rented), OR Confirmation that suitable arrangements are in place for arrear municipal obligations with your local municipality. OR Current municipal rates which is not older than 90 days or valid lease agreement with affidavit from owner of property in cases stated in Proof of Good Standing with regards to municipal accounts documents.	•	•		
	Municipal Rates and Taxes - Current municipal rates for the directors of the entity not older than 90 days (if leasing/renting, submitted proof such of lease agreement where premises are rented), OR Confirmation that suitable arrangements are in place for arrear municipal obligations with your local municipality. OR Current municipal rates which is not older than 90 days or valid lease agreement with affidavit from owner of property in cases stated in Proof of Good Standing with regards to municipal accounts documents.	•	•		
	3-year financial statements (audited where applicable)	•	•		
	Joint Venture Consortium or equivalent Agreement signed by all parties if applicable.	•	•		
	Any qualifications. If “Yes”, reference to such qualification/s must be indicated on a cover letter. Please be aware that qualification on the tender document may result in your tender being eliminated as the qualification may impede on the ability to evaluate like with like.	•			
4.	Functionality Documentation:				
	Documentary Evidence Required for Criteria 1 – (Contactable Reference Letters and Completion / Approval Certificates)	•			
	Documentary Evidence Required for Criteria 2 – (CV, qualifications, and valid registration)	•			
	Documentary Evidence Required for Criteria 3 – (CV, qualifications, and valid registration)	•			

Employer:		Contractor:	
Witness:		Witness:	

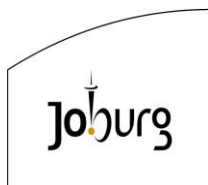


Contract No JW 14452
BUILDING UPGRADE FOR THE
MEGA WAREHOUSE IN LANGLAAGTE DEPOT
Volume 1 Tender and Contract
Section T1 Tender and Contract



Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
5.	Specific Goals:				
	Documentary Evidence Required for Criteria 1 – Valid BBBEE Certificate issued by SANAS accredited verification agency or Affidavit sworn under oath, OR CIPC registration document showing percentage of ownership and share certificate where applicable	•			
	Documentary Evidence Required for Criteria 2 – Valid BBBEE Certificate issued by SANAS accredited verification agency or Affidavit sworn under oath, OR CIPC registration document showing percentage of ownership and share certificate where applicable	•			
	Documentary Evidence Required for Criteria 3 – Proof of municipal account / valid lease agreement, letter from the Ward Council confirming the business address	•			
	Documentary Evidence Required for Criteria 4 – Valid BBBEE Certificate issued by SANAS accredited verification agency or Affidavit sworn under oath, and Registration with military veteran's database (stamped printout from military veteran's office showing the principal member with the ID number will be required), OR Registration a Military Veteran Company (stamped printout from military veteran's office showing the principal member with the ID number will be required)				
	Documentary Evidence Required for Criteria 5 – Valid BBBEE Certificate issued by SANAS accredited verification agency, or Affidavit sworn under oath, and Medical Certificate from medical doctor or SARS Confirmation of Diagnosis of Disability	•			
6.	Scope of Work				
	Scope of Work and or Specifications	•			
7.	Pricing Schedule:				
	Pricing Schedule/ Bill of Quantities completed in accordance with the award strategy	•			
	Alterations authenticated – Refer to Acknowledgment of Tender Conditions	•			
8.	Site Information:				
	Site Information			•	
9.	Occupational Health, Safety and Environmental Specification				
	Acknowledgement of SHE Specification & Annexures			•	
10.	Tender Drawings:				
	Acknowledgement of Project Tender Drawings			•	

Employer:		Contractor:	
Witness:		Witness:	



Contract No JW 14452
BUILDING UPGRADE FOR THE
MEGA WAREHOUSE IN LANGLAAGTE DEPOT
Volume 1 Tender and Contract
Section T1 Tender and Contract



Ref	Description of Returnable/s or Documentation that will form Part of Contract and must therefore to be Completed and / or Submitted by the Tenderer	Required for Tender Evaluation	Required for Tender Award	Required After Tender Award	Submitted (Yes/No)
11.	Terms and Conditions:				
	General Conditions of Contract	•			
	Tender Data	•			
	Pricing Data	•	•		
12.	Other Documents				
	Form of Acceptance (do not complete Form of Acceptance it will be completed by JW official.)			•	
	Public Liability Insurance			•	
	Valid Registration with Compensation for Occupation Injuries and Diseases Act			•	
	Performance Security – where applicable for industrial related services			•	
	Resolution Letter for the Subcontractor (a letter authorizing the person completing the tender to sign on behalf of the company) – if applicable		•		
	Comprehensive Health and Safety Plan (compliance with OHSE Specification - if applicable			•	

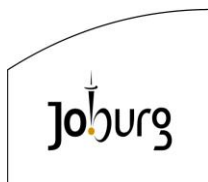
Tenderers will be notified of such missing and incomplete documents and will be offered a period of 3 days to complete or submit those pages i.e., Municipal Bidding Documents (MBD), authority to sign and other documents that require completion and signatures that do not have a bearing on functionality, price and preference points for specific goals.

Tenders that are received contrary to the above requirements will be disqualified after three (3) days period has lapsed.

If locality is a specific goal in MBD6.1 – the requested documentation may not be used to allocate points for specific goals.

Signature: _____ Date: _____

Employer:		Contractor:	
Witness:		Witness:	



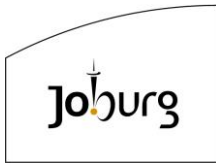
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BUILDING UPGRADE FOR THE
MEGA WAREHOUSE IN LANGLAAGTE DEPOT
Volume 1 Tender and Contract
Section T1 Tender and Contract



Volumes	Contents	
Number	Number	Heading
Volume 1	Part 1: Tender Procedures	
	T1.1	Tender Data
	Part 2: Returnable Documents	
	T2.1	List of Returnable Documents
	T2.2	Returnable Schedules
	Part 1: Agreement and Contract Data	
	C1.1	Form of Offer and Acceptance
	C1.2	Contract Data
	C1.3	Forms of Securities
	Part 2: Pricing Data	
	C2.1	Pricing Instructions
	C2.2	Bill of Quantities
Volume 2A	Part 3: Scope of Work	
	C3	Scope of Work
Volume 2B		Particular Specifications
Volume 2A	Part 4: Site Information	
	C4	Site Information
Volume 3		Occupational Health and Safety Specification and Environmental Management Plan
Volume 4		Tender Drawings (If applicable)

Only Volume 1 and Volume 2A must be returned.

Employer:		Contractor:	
Witness:		Witness:	



Contract No JW 14452

BUILDING UPGRADE FOR THE MEGA WAREHOUSE
IN LANGLAAGTE DEPOT
Volume 1 Tender and Contract
Section T1 Tendering Procedures

Johannesburg Water (SOC) Ltd

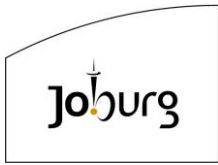


CONTRACT NO. JW14452

**BUILDING UPGRADE FOR THE MEGA
WAREHOUSE IN LANGLAAGTE DEPOT**

VOLUME 1

TENDERING PROCEDURES

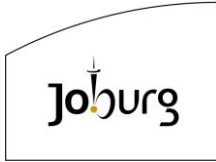


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T1.1 TENDER DATA

T1.1.1 Conditions of Tender

The conditions of tender are the Standard Conditions of Tender as contained in Annex C of the CIDB Standard for Uniformity in Construction Procurement (August 2019). (See www.cidb.org.za).

The Standard Conditions of Tender make several references to the Tender Data for details that apply specifically to this tender. The Tender Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the Standard Conditions of Tender.

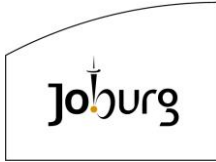
Each item of data given below is cross-referenced to the clause in the Standard Conditions of Tender to which it mainly applies.

T1.1.2 Tender Data

The clause numbers in the Tender Data refer to the corresponding clause numbers in the Conditions of Tender.

The additional Conditions of Tender are:

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



BUILDING UPGRADE FOR THE MEGA WAREHOUSE
IN LANGLAAGTE DEPOT
Volume 1 Tender and Contract
Section T1 Tendering Procedures

Clause number	Tender Data
C.1.4	The Employer's representative is: Contact Person: Tshilidzi Tshikovhi Telephone: 011 688 1686 E-mail address: tshilidzi.tshikovhi@jwater.co.za The SCM representative is: Contact Person: Tshilidzi Takalani Telephone: 011 688 1772 E-mail address: tshilidzi.takalani@jwater.co.za
C.2.1	Eligibility criteria and requirements CIDB registration and grading: 1) Only tenderers who are registered with the CIDB and were capable of being so prior to the evaluation of submissions, in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the sum tendered for an 7GB class of construction work, are eligible to submit tenders. Tenders must have an Active status at the required CIDB grading at time of tender evaluation for the bidder to meet the eligibility criteria and requirement. 2) Joint ventures are eligible to submit tenders provided that: i) every member of the joint venture is registered with the CIDB; and ii) the combined contractor grading designation calculated in accordance with the CIDB Regulations is equal to or higher than a contractor grading designation determined in accordance with the sum tendered for an 7GB class of construction work. Failure to meet to Eligibility criteria and requirements will result in disqualification.
C.2.8	Replace the contents of the clause with the following: “Request clarification of the tender documents, if necessary, by notifying the Employer's Officials indicated on the Tender Notice and Invitation to Tender in writing at least seven (7) working days before the closing time stated in the foregoing notice and clause C.2.15.1”
C.2.9	Add the following to the clause: “Accept that the submission of a Tender shall be construed as an acknowledgement by the Tenderer that they are satisfied with the insurance cover, the Employer will affect under the contract.”
C.2.10.5	Add the following to the clause: A price or rate is to be entered against each item in the Bill of Quantities, whether the quantities are stated or not. An item against which no price is entered will be considered to be covered by the other prices in the Schedule.



BUILDING UPGRADE FOR THE MEGA WAREHOUSE
IN LANGLAAGTE DEPOT
Volume 1 Tender and Contract
Section T1 Tendering Procedures

Clause number	Tender Data
C.2.11	The evaluation on price alteration will be conducted as follows: Where the tender award strategy is to evaluate and award per item or category, the following must apply: • If there is an alteration on the rate but no alteration on the total for the item or category, the bidder will not be disqualified • If there is an alteration on the total for the item/s without authentication, bidders will only be disqualified for alteration per item or category. Where the tender award strategy is to evaluate and award total bid offer, the following must apply: a) If there is an alteration on the rate, total for the line item, sub-total/ sum brought/carried forward for the section but no alteration on the total bid offer, the bidder will not be disqualified. b) If there is an alteration on the total bid offer on form of offer, then the amount in words must be considered or vice-versa. c) If there is an unauthenticated alteration on the total bid offer and the amount in words is not authenticated, the bidders will be disqualified for the entire tender. Where the tender pricing schedule or bill of quantities is requesting rates/price from bidder/s without providing a total, the following will apply: a) (i) If there is an unauthenticated alteration on the unit rate/price the bidder must be disqualified. Corrections may not be made using correction fluid, correction tape or the like, bid received contrary to this will be disqualified.
C.2.12.1	Replace Contents Alternative offers will not be permitted.
C.2.12.2	Failure to complete bid amount on the form of offer and sign full will result in the elimination of the tender.
C.2.13.3	Each tender offer shall be submitted as an original. Tenderers are also requested to submit a soft copy in a USB (Tenderers who do not submit a soft copy will not be disqualified)
C.2.13.5	The Employer's address for delivery of tender offers and identification details to be shown on the Tenderer's offer package are: Location of tender box: Ground Floor Entrance Physical address: Johannesburg Water (SOC) Ltd Turbine Hall 65 Ntemi Piliso Street Newtown Johannesburg 2001 Identification details: Tender reference number, Title of Tender and the closing date and time of the tender, <i>as well as the Tenderer's name, their Authorised Representative's name, postal address and telephonic contact numbers.</i>



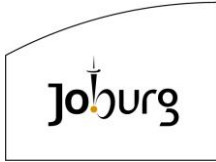
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IN LANGLAAGTE DEPOT
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Section T1 Tendering Procedures

Clause number	Tender Data
C.2.13.6 & C.3.5	A two-envelope procedure will not be followed.
C.2.15.1	The closing time for submission of tender offers is as stated in the Tender Notice and Invitation to Tender.
C.2.16	The tender offer validity period is 90 days.
C.2.16.1	Add the following to the clause: "If the tender validity expires on a Saturday, Sunday or public holiday, the Tender Offer shall remain valid and open for acceptance until the closure of business on the following working day."
C.2.23	The Tenderer is required to submit with his tender: 1) Valid SARS Compliance status Pin for Tenders issued by the South African Revenue Services. 2) Proof of CSD registration i.e. MA number 3) A Certificate of Contractor Registration issued by the CIDB. 4) where the tendered amount inclusive of VAT exceeds R 10 million: i. audited annual financial statement for 3 years, or for the period since establishment if established during the last 3 years, if required by law to prepare annual financial statements for auditing; ii. if the bidder is not required by law to prepare financial statements, then the bidder is required to submit their unaudited financial statements prepared by an independent accounting professional. 5) Proof that the tenderer and directors of the tenderer are not in arrears for more than 90 days with municipal rates and taxes and municipal service charges, The latest municipal account is to be attached, or a signed copy of the valid lease agreement if the tenderer or director of the tenderer is currently leasing premises and not responsible for paying municipal accounts. i. Should the municipal statement that was submitted with the tender document before tender closing date and time be in arrears for more than 90 days at time of award, the tenderer will be requested to submit the latest municipal statement which shows that the tenderer is not in arrears for more than 90 days. If the statement at that time is in arrears for more than 90 days, the tenderer must submit before the stipulated deadline, the written proof of an approved arrangement with the municipality. ii. The proof may be a copy of the agreement or an updated municipal statement which reflects the arrangement. iii. Should this tender be considered for award of the contract, based on proof of submission and should proof of such submission be found to be invalid, erroneous or inaccurate, the tenderer will no longer be considered for the award of the contract. iv. Statement must not be older than 90 days from the closing date of this tender. Attach latest municipal account statement behind this page. v. In cases where the director of the tenderer resides with their spouse, parent, partner or sibling the owner of the property that confirm where the director of the tenderer resides must submit an affidavit stating such and explaining the relationship. This would happen in the case where the submitted municipal statement or lease agreement is not in the name of the director of the tenderer. Point (i) will be applicable. vi. In cases where the business address of the tenderer is also the official residence of the director of the tenderer, the director of the tenderer must submit an affidavit



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Clause number	Tender Data
	stating such. Proof that the municipal statement is not in arrears for more than 90 days or a valid lease agreement must be submitted. Point (i) will be applicable. Where a tenderer satisfies CIDB contractor grading designation requirements through joint venture formation, such tenderers must submit the Certificates of Contractor Registration in respect of each partner.
C.2.24	Add the following new clause: Canvassing and obtaining of additional information by tenderers Accept that no Tenderer shall make any attempt either directly or indirectly to canvass any of the Employers officials or the Principal Agent in respect of his tender, after the opening of the tenders but prior to the Employer arriving at a decision thereon. No Tenderer shall make any attempt to obtain particulars of any relevant information, other than that disclosed at the opening of tenders." ."
C.2.25	Add the following new clause: Prohibitions on awards to persons in service of the state Accept that the Employer is prohibited to award a tender to a person - a) who is in the service of the state; or b) if that person is not a natural person, of which any director, manager, principal shareholder or stakeholder is a person in the service of the state; or c) a person who is an advisor or consultant contracted with the municipality or municipal entity. "In the service of the state" means to be - i) a member of: - • any municipal council. • any provincial legislature; or • the National Assembly or the National Council of Provinces. ii) a member of the board of directors of any municipal entity. iii) an official of any municipality or municipal entity. iv) an employee of any national or provincial department. v) provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No.1 of 1999). vi) a member of the accounting authority of any national or provincial public entity; or vii) an employee of Parliament or a provincial legislature." In order to give effect to the above, the questionnaire for the declaration of interests in the tender of persons in service of state in Section T2.1 must be completed.
C.2.26	Add the following new clause: Awards to close family members of persons in the service of the state Accept that the notes to the Employer's annual financial statements must disclose particulars of any award of more than R 2 000 to a person who is a spouse, child or parent of a person in the service of the state (defined in clause C.2.25), or has been in the service of the state in the previous twelve months, including a) the name of that person; b) the capacity in which that person is in the service of the state; and c) the amount of the award.



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



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C.3.9	Replace Existing Clause Arithmetic Errors Construction related tenders JW undertakes to check the highest scoring bid for arithmetical errors and correcting them as follows: JW shall check for arithmetic errors using the following sequence: (i) Check the amount in words against the amount in figures on the <i>Form of Offer</i>, (ii) Check the Form of Offer against the Summary Schedule Total, (iii) Check the Section Sub-Totals per section against the Summary Total for summation errors, (iv) Check the Section Sub-Totals in the Summary Schedule against Section Sub-Totals in the Bill of Quantities. (v) Check the Section Sub-Totals against the Item Totals for summation errors. (vi) Check the Item Totals against the product of the Item Rate and the Quantity Provided. If a bill of quantities or price schedule applies JW will request the bidder to correct the arithmetic errors as follows: (i) In respect of the Form of Offer, where there is a discrepancy between the amounts in figures and the amount in words, the amount in words shall govern. The bidder must be requested to adjust the amount in figures to correspond with the amount in words. JW will notify the tenderer of all errors or omissions that are identified in the tender offer and either request the tenderer to confirm the offer as tendered or JW will accept the corrected total of prices. Where the tenderer elects to confirm the tender offer as tendered, correct the errors as follows: (i) If bills of quantities or pricing schedules apply and there is an error in the line-item total resulting from the product of the unit rate and the quantity, the line-item total shall govern, and the rate shall be corrected. Where there is an obviously gross misplacement of the decimal point in the unit rate, the line-item total as quoted shall govern, and the unit rate shall be corrected. (ii) Where there is an error in the total of the prices either as a result of other corrections required by this checking process or in the tenderer's addition of prices, the total of the prices shall govern, and the tenderer will be requested to revise selected item prices (and their rates if bills of quantities apply) to achieve the tendered total of the prices. Clarification session(s) shall be held with Tenderer where there is pricing discrepancies, errors are highlighted and identified corrections are explained. Tenderer is afforded an opportunity to provide clarification, accept or reject identified corrections in writing. (i) In the event that the Tenderer accepts identified corrections, JW will proceed with evaluation. (ii) In the event that the Tenderer rejects the identified correction(s), JW must review the Tenderer's motivation and risks associated with the proposed change. This is not an opportunity for Tenderers to change the bid offer. A bidder that does not agree to the above will be disqualified.



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Clause number	Tender Data										
	Risk related to the Arithmetic Corrections shall be assessed. Where risks are identified, tenderers shall provide JW with any other material or information that has a bearing on the tender offer, the tenderer's commercial position (including joint venture agreements), quotations preferencing arrangements or samples of materials considered necessary by JW for the purpose of a full and fair risk assessment. Should the tenderer not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in the JW request or fails to attend any meeting in which it has been formally invited to clarify any issue, the tender offer will be regarded as non-responsive.										
C.3.11	Tenderer to complete, sign and return MBD6.1 with the tender submission. Tenderer to claim the points in the space provided and submit documentary evidence to support the points claimed for specific goals. <table border="1"> <thead> <tr> <th>STAGE</th><th>DESCRIPTION</th></tr> </thead> <tbody> <tr> <td>Stage 1</td><td>Mandatory Evaluation</td></tr> <tr> <td>Stage 2</td><td>Administrative Evaluation</td></tr> <tr> <td>Stage 3</td><td>Technical Evaluation</td></tr> <tr> <td>Stage 4</td><td>Preferential Procurement Goals and Pricing Evaluation</td></tr> </tbody> </table>	STAGE	DESCRIPTION	Stage 1	Mandatory Evaluation	Stage 2	Administrative Evaluation	Stage 3	Technical Evaluation	Stage 4	Preferential Procurement Goals and Pricing Evaluation
STAGE	DESCRIPTION										
Stage 1	Mandatory Evaluation										
Stage 2	Administrative Evaluation										
Stage 3	Technical Evaluation										
Stage 4	Preferential Procurement Goals and Pricing Evaluation										



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Stage 1: Mandatory Requirement

Description			Complied	
No	Description		Yes	No
1	CIBD grading 7GB or higher. Active Status at the required CIDB grading or higher at the time of Evaluation			
2	Mandatory Tender Briefing Meeting			
3	Form of Offer Completed and Signed			

Tenderers who **FAIL** to meet the mandatory criteria or requirements of tender will result in disqualification.

Stage2: Administrative Evaluation

Description			Complied	
Reference	Description	Requirement	Yes	No
Certificate of Authority	Signed Certificate of Authority to Sign or signed board resolution	Completed and signed certificate of authority to sign or signed board resolution		
MBD 1	Invitation to Bid	Complete and submit complete and signed MBD 1 Form		
CSD	Central Supplier Database Registration	Provide proof of CSD registration		
MBD 4	Declaration of interest	Complete and submit signed MBD 4 Form		



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	MBD 5	Declaration for procurement above 10 million (all applicable taxes included)	Complete and submit signed MBD 5 Form		
	MBD 6.1	Preference Points Claim in Terms of The Preferential Procurement Regulations 2022	Complete and submit signed MBD 6.1 Form		
	MBD 8	Declaration of bidder's past supply chain management practices	Complete and submit signed MBD 8 Form		
	MBD 9	Certificate of Independent Bid Determination	Complete and submit signed MBD 9 Form		
	Description			Complied	
	Reference	Description	Requirement	Yes	No
	Annexure – Proof of Specific Goals	Valid Construction Sector BBBEE Certificate issued by SANAS accredited verification agency or Affidavit sworn under oath, OR CIPC registration document showing percentage of ownership and share certificate where applicable	Submit applicable documentation with the tender submission		
	Annexure – Proof of Specific Goals	Valid Construction Sector BBBEE Certificate issued by SANAS accredited verification agency or Affidavit sworn under oath, OR CIPC registration document showing percentage of ownership and share certificate where applicable	Submit applicable documentation with the tender submission		
	Annexure – Proof of Specific Goals	Proof of municipal account / valid lease agreement, letter from the Ward Council confirming the business address	Submit applicable documentation with the tender submission		



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	Annexure T2.2.4	Municipal statement of account for Company (not older than three (03) months from the closing date of tender or a valid lease agreement at time of tender closure)	Submit applicable documentation with the tender submission		
	Description			Complied	
	Reference	Description	Requirement	Yes	No
	Annexure T2.2.4	Municipal statement of account for Director/s (not older than three (03) months from the closing date of tender or a valid lease agreement at time of tender closure)	Submit applicable documentation with the tender submission		
	Annexure	3-year financial statements (audited where applicable)	Submit applicable documentation with the tender submission		
	Annexure	Joint Venture Consortium or equivalent Agreement signed by all parties, where applicable	Where applicable, submit applicable documentation with the tender submission		
Tenderers will be notified of any omitted, outstanding, missing and or incomplete administrative documents and will be offered a period of 3 days to complete or submit those pages i.e., Municipal Bidding Documents (MBD), authority to sign and other administrative documents that require completion and signatures. These exclude documentation on functionality, price and preference points for specific goals. Tenders that are received contrary to the above requirements will be disqualified after three (3) days period has lapsed. Any document or form submitted or completed upon request (was not included in the initial tender submission before the closing date) will not be used to claim points for specific goals.					



STAGE 3: TECHNICAL REQUIREMENTS

Technical evaluation - as per tender document and award strategy.

The following aspects will be considered during the Technical Evaluation:

CRITERIA NO #	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAX SCORE	SCORE
1	Tenderers Experience with Respect to Industrial / Commercial Building Construction.	Supporting Documents Required include Contactable Reference Letters as per T2.1.6 (Or on Client Letter Head with all required Information) and Works Completion / Certificate of Completion / Certificate of Final Completion / Final Approval Certificate. Note: <i>This reference letter must be completed by the referee/previous client of the tenderer and included in the tender submission. Alternatively, the Client's letterhead may be used provided it complies with all functional requirements. A separate form must be completed for each reference as a requirement in the evaluation criteria. The information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting in participating in any future government tenders.</i>	NUMBER OF COMPLETED COMMERCIAL / INDUSTRIAL BUILDING CONSTRUCTION PROJECTS WITH MINIMUM FLOOR AREA OF 1000M² WITH MINIMUM CONSTRUCTION VALUE OF R13 MILLION PER PROJECT	0 Completed Projects	40	0
				1 Completed Project		20
				2 Completed Projects		28
				3 or more Completed Projects		40



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NO #	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAX SCORE	SCORE
2	Post Qualification Experience of Contract Manager Only a Contract Manager with minimum qualification of BTech / Bsc / BEng: Engineering (Civil) or Project Management or Quantity Survey or Construction Management AND ECSA Professional Registration (Pr. Eng. / Pr. Technologist) or SACPCMP Professional Registration (PrCPM / PrCM) will obtain a score for experience of a Contract Manager . However, the date of registration of Contract Manager	Tender must Provide CV of Contract Manager in the format given on T2.1.9 Note: <i>Tenderers may provide their own CVs but information provided should contain all information in T2.1.9</i> Note: <i>Certified Copies of qualifications and a valid registration certificate to accompany the CVs. The information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting in participating in any future government tenders.</i>	NUMBER OF COMPLETED CIVIL ENGINEERING OR BUILDING CONSTRUCTION PROJECTS AS CONTRACT MANAGER.	0 Completed Projects	20	0
	1 - 2 Completed Projects	10				
	3 – 4 Completed Projects	14				
	More than 4 Completed Projects	20				



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	will not impact post qualification number of projects.					
NO #	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE		MAX SCORE	SCORE
3	Post Qualification Experience of Construction Manager Only a Construction Manager with qualifications of National Diploma in Civil Engineering / Building Science or higher	Tender must Provide CV of Construction/Site Manager in the format given on T2.1.9 <i>Note: Tenderers may provide their own CVs but information provided should contain all information in T2.1.9</i> <i>Note: Certified Copies of qualifications to accompany the CVs. The information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting in participating in any future government tenders.</i>	NUMBER OF COMPLETED COMMERCIAL / INDUSTRIAL BUILDING CONSTRUCTION PROJECTS AS CONSTRUCTION MANAGER, EACH WITH MINIMUM FLOOR AREA OF 1000M² & EACH WITH VALUE EXCEEDING R 10 MILLION.	0 Completed Projects	25	0
				2 Completed Projects		12.5
				3 Completed Projects		17.5
				More than 3 Completed Projects		25



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NO #	CRITERIA	EVIDENCE	SUB-CRITERIA/CLAUSE	MAX SCORE	SCORE
4	Post Qualification Experience of Safety Officer Only a Safety Officer with qualifications of National Diploma (Safety Management/ Environmental Health/Environmental Science/ Environmental Management), SAMTRAC / SHEOMTRAC/ SHEMTRAC / MESHTRAC /NEBOSH / Safety	Tender must Provide CV of Safety Officer in the format given on T2.1.9 All Civil / Building construction projects will be considered. <i>Note: Certified Copies of qualifications and a valid registration certificate or the proof to register with SACPCMP in the "Construction Health and Safety" Sector to accompany the CVs. The information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting in participating in any future government tenders.</i>	0 Completed Projects	15	0
			1 - 2 Completed Projects		7.5
			3 - 4 Completed Projects		10.5
			More than 4 Completed Projects		15



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	Officers Course (NQF 5) or more AND Registered with SACPCMP in the “Construction Health and Safety” Sector OR Submitted the proof to register with SACPCMP in the “Construction Health and Safety” Sector will obtain a score for experience of a Safety Officer. However, the time of registration of Safety Officer will not impact post qualification number of projects.						
Minimum Acceptable Score							70
Maximum Possible Score							100



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**Tenderers who FAIL to meet the technical criteria or requirements of tender will be disqualified. Only certified copies of the information originally submitted will be accepted.*

NOTE 1: Where applicable, foreign qualifications MUST be accompanied by a SAQA verification certificate. Failure to submit SAQA verification certificate will lead to that qualification not being considered for allocation of points for that criterion.

SACPCMP: South African Council for the Project and Construction Management Professions

SAMTRAC: Safety Management Training Course

NEBOSH: National Examination Board in Occupational Safety and Health

SHEOMTRAC: Safety Health Environmental Occupational Management Training Course

SHEMTRAC: Safety Health Environmental Management Training Course

MESHTRAC: Management Environmental Safety Health Training Course

Tenderers who **FAIL** to meet the minimum required score or requirements of tender will be disqualified.



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C.3.11.2 &
C.3.11.3

The procedure for the evaluation of responsive tenders is Method 2 (Financial Offer and Specific Goals):

1. APPLICATION OF THE PREFERENCE POINTS SCORING SYSTEM

The following preference point systems are applicable to all bids:

- The 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included); and
- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).
- If unclear, any preference points scoring may be included and the lowest acceptable tender will be used to determine the preference points to be used for the evaluation. Where the lowest acceptable tender is below R50 million, the 80/20 preference point system must be used and if the lowest acceptable tender is above R50 million, the 90/10 preference point system must be used.
- The Specific Goals for the tender will be stated in MBD 6.1. In MBD 6.1, the tenderer must indicate how many points they are claiming for each Specific Goal and must submit all the required supporting documentation for the points to be verified and awarded by JW. The BEC will evaluate the submitted supporting documentation and confirm Specific Goal points claimed by the tenderer. Specific goals to be allocated by the BEC will depend on verification documentation submitted.
- Only tenderers that have completed and signed MBD_6.1 and submitted applicable verification documents will be allocated Specific Goal points for preferencing.

(a) The value of this bid is estimated not to exceed R50 000 000 (all applicable taxes included) and therefore the 80/20 preference point system shall be applicable.

(b) Preference points for this bid shall be awarded for:

Price; and

Specific Goals.

(c) The maximum points for this bid are allocated as follows:

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

(d) Failure on the part of a bidder to submit proof of specific goals points claimed in MBD_6.1 will not result in disqualification but will result in points not being awarded for Specific Goals.

Specific Goals

In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations 2022, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in



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table 1 below as must be supported by proof/ documentation stated in the conditions of this tender.

Specific goals may include contracting with persons, or categories of persons, historically disadvantaged by unfair discrimination on the basis of race, gender or disability.

Race:

- I. Ownership by black people
- II. Black Designated Group:
 - Ownership by black people that are unemployed
 - Ownership by black people who are youth
 - Ownership by black people living in rural or underdeveloped areas or townships
 - Ownership by black people with disabilities
 - Ownership by black people who are military veterans
 - Cooperative owned by black people

Gender:

- I. Persons, or categories of persons, historically disadvantaged by unfair discrimination on the basis of gender are women. Ownership by persons that are classified as female or women according to the Department of Home Affairs of South African.

Disability:

- I. Persons, or categories of persons, historically disadvantaged by unfair discrimination on the basis of disability are disabled persons.

Reconstruction and Development Programme (RDP) objectives as published in Government Gazette No. 16085 dated 23 November 1994 i.e.,

Local Manufacture:

- I. Promotion of procurement of locally manufactured goods in South Africa to promote job creation in light of the high unemployment rate in South Africa which has a greater impact previously disadvantaged individuals and black youth.

Locality:

- I. Promotion of procurement from local business in the geographical areas that JW operate in. This is also directed at creating employment in the areas JW operate in. The BSC may allocate points as follows:
 - Promotion of enterprises located in the Gauteng Province
 - Promotion of enterprises located in a specific region within COJ (the 7 regions. A to G)
 - Promotion of enterprises located in the City of Johannesburg municipality
 - Promotion of enterprises located rural or underdeveloped areas or townships.

Qualifying Small Enterprises (QSE)

- I. Promotion of procurement from QSE's that are black owned.



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Exempted Micro Enterprises (EME):

- I. Promotion of procurement from EME's that are black own.

SUB-CONTRACTING:

Promotion of sub-contracting a Historically Disadvantaged Individuals (HDI) company.

Consider sub-contract only in cases where there are no company which can meet any of the specific goals. Check if the portion of the work cannot be subcontracted in terms of specific goals.

One goal may be chosen, or a combination of goals may be decided upon including a sub-goal i.e., owned by black people that are disabled etc.,

JOINT VENTURE, CONSORTIUM OR EQUIVALENT:

For Joint Venture Agreements, Consortiums or equivalent, the agreement must show percentages of ownership and work to be completed by each party. This agreement must form part of the tender submission.

To determine the Joint Venture, Consortium or equivalent score for specific goals, JW will look at the consolidated BBBEE certificate to determine the points for specific goals that will be awarded to the tenderer. If a consolidated BBBEE certificate is not submitted, the parties to the joint venture, consortium or equivalent must submit their individual BBBEE certificates issued by a SANAS accredited verification agency or the documents listed below on 4.6 and the joint venture, consortium or equivalent agreement in order for JW to determine the proportional points for specific goals.

Documentation to be provided:

- JV, Consortium, or equivalent agreement
- Consolidated BBBEE certificate issued by an SANAS accredited verification agency. Certificate must be valid.

Table 1:

The specific goals allocated points in terms of this tender	Number of points allocated (80/20 system)
Businesses located within the boundaries of Gauteng Province	6
Business owned by 51% or more-Women	4
Business owned by 51% or more-Black Youth	4
Business owned by 51% or more - Black People who are military Veterans	2
Business owned by 51% or more-Black People with Disabilities	4



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	<table><tr><td>Total</td><td>20</td></tr></table>	Total	20								
	Total	20									
	The following verification documents must be submitted with the tender document:										
	<table><tr><th>SPECIFIC GOALS – ANY ONE OR A COMBINATION OF ANY</th><th>MEANS OF VERIFICATION THAT MAY BE SELECTED OR A COMBINATION THEREOF</th></tr><tr><td>Business owned by 51% or more – Black Youth</td><td> - Valid BBBEE Certificate issued by SANAS accredited verification agency, OR - CIPC registration document showing percentage of ownership and share certificate where applicable </td></tr><tr><td>Business owned by 51% or more- Women</td><td> - Valid BBBEE Certificate issued by SANAS accredited verification agency, OR - CIPC registration document showing percentage of ownership and share certificate where applicable </td></tr><tr><td>Businesses located within the boundaries of Gauteng Province</td><td> - Proof of municipal account / valid lease agreement, letter from the Ward Council confirming the business address. </td></tr><tr><td>Business owned by 51% or more - Black People who are military Veterans</td><td> - Valid BBBEE Certificate issued by SANAS accredited verification agency, and - Registration with military veteran's database (stamped printout from military veteran's office showing the principal member with the ID number will be required), OR - Registration a Military Veteran Company (stamped printout from military veteran's office showing the principal member with the ID number will be required)." </td></tr></table>	SPECIFIC GOALS – ANY ONE OR A COMBINATION OF ANY	MEANS OF VERIFICATION THAT MAY BE SELECTED OR A COMBINATION THEREOF	Business owned by 51% or more – Black Youth	- Valid BBBEE Certificate issued by SANAS accredited verification agency, OR - CIPC registration document showing percentage of ownership and share certificate where applicable	Business owned by 51% or more- Women	- Valid BBBEE Certificate issued by SANAS accredited verification agency, OR - CIPC registration document showing percentage of ownership and share certificate where applicable	Businesses located within the boundaries of Gauteng Province	Proof of municipal account / valid lease agreement, letter from the Ward Council confirming the business address.	Business owned by 51% or more - Black People who are military Veterans	- Valid BBBEE Certificate issued by SANAS accredited verification agency, and - Registration with military veteran's database (stamped printout from military veteran's office showing the principal member with the ID number will be required), OR - Registration a Military Veteran Company (stamped printout from military veteran's office showing the principal member with the ID number will be required)."
	SPECIFIC GOALS – ANY ONE OR A COMBINATION OF ANY	MEANS OF VERIFICATION THAT MAY BE SELECTED OR A COMBINATION THEREOF									
	Business owned by 51% or more – Black Youth	- Valid BBBEE Certificate issued by SANAS accredited verification agency, OR - CIPC registration document showing percentage of ownership and share certificate where applicable									
Business owned by 51% or more- Women	- Valid BBBEE Certificate issued by SANAS accredited verification agency, OR - CIPC registration document showing percentage of ownership and share certificate where applicable										
Businesses located within the boundaries of Gauteng Province	Proof of municipal account / valid lease agreement, letter from the Ward Council confirming the business address.										
Business owned by 51% or more - Black People who are military Veterans	- Valid BBBEE Certificate issued by SANAS accredited verification agency, and - Registration with military veteran's database (stamped printout from military veteran's office showing the principal member with the ID number will be required), OR - Registration a Military Veteran Company (stamped printout from military veteran's office showing the principal member with the ID number will be required)."										



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**Business owned by 51% or more-
Black People with Disabilities**

- Valid BBBEE Certificate issued by SANAS accredited verification agency, and
- Medical Certificate from medical doctor or SARS Confirmation of Diagnosis of Disability."

Note: The joint venture, consortium, or equivalent agreement in order for JW to determine the proportional points for specific goals.

Example, If there are two parties in a Joint Venture with a 50:50 ownership of the Joint Venture and one party is located within the boundaries of COJ and one is located in Tshwane, if one of the goals is locality and has total points of 4, the JV will only be entitled the proportional points of 2.

The following are the requirements for a valid Sworn Affidavit in terms of the BBBEE Sector Codes of Good Practise:

Affidavit Prescribed Formats	Category	Financial Threshold
Generic Enterprises		
	BO QSE	Between R10m and R50m
	BO EME	Less than R10m
Sector Specific Enterprises		
	BO QSE	Between R10m and R50m
	BO EME	Less than R10m
Construction Sector Code		
	EME Contractor	Less than R3m
	BO EME BEP	Less than R1.8m
Financial Sector Code		
	BO QSE	Between R10m and R50m
	BO EME	Less than R10m
Information Communication Technology Sector Code (ICT)		
	BO QSE	Between R10m and R50m
	BO EME	Less than R10m
Marketing, Advertising & Communication Sector Code (MAC)		
> Public Relations	BO QSE	Between R5m and R10m
> Marketing, Advertising & Communications	BO EME	Less than R5m
Property Sector Code		
> Service-based	BO QSE	Between R5m and R10m
	EME	Less than R5m
> Agency-based	BO QSE	Between R2.5m and R35m
> Asset-based	EME	Less than R2.5m
	BO QSE	Between R80m and R400m
Tourism Sector Code		
	BO QSE	Between R5m and R45m
	BO EME	Less than R5m



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Specialised Enterprises		
	BO QSE	Between R10m and R50m
	BO EME	Less than R10m

Note: A sworn affidavit received from a tenderer that does not meet the above requirement will not be considered for the allocation of points for specific goals.

Requirements for a valid BBBEE Certificate are as follows:

- Copy of a certified valid BBBEE certificate (Only Valid BBBEE accredited by SANAS), or a valid Sworn Affidavit.
- Bidders who do NOT qualify as EME's and QSE's as outlined above must submit B-BBEE verification certificates that are issued by an Agency accredited by SANAS.
- Bidders who fail to submit a certified copy of their valid B-BBEE certificate or valid sworn affidavit will score zero points for specific goals.

Valid Sworn Affidavits or certified copies of B-BBEE Certificate must comply with the requirements outlined in the Justices of the Peace and Commissioners of Oaths Act, no 16 of 1963 and its Regulations promulgated in Government Notice GNR 1258 of 21 July 1972 Justices of the Peace and Commissioners of Oaths Act, No. 16 of 1963. i.e.

- The deponent shall sign the declaration in the presence of the commissioner of oaths (COA).
- Below the deponent's signature the COA shall certify that the deponent has acknowledged that he knows and understands the contents of the declaration and the COA shall state the manner, place, and date of taking the declaration.
- The COA shall sign the declaration and print his full name and business address below his signature; and state his designation and the area for which he holds his appointment, or the office held by him if he holds his appointment ex officio.
- Copy of certified copies will not be accepted.

Note: A tenderer failing to submit proof of specific goals claimed as per indicated above will not be disqualified but will be allocated zero points for specific goals and will be allocated points for pricing.

2. ADJUDICATION USING A POINT SYSTEM

- The bidder obtaining the highest number of total points will be awarded the contract.
- Preference points shall be calculated after prices have been brought to a comparative basis taking into account all factors of non-firm prices and all unconditional discounts;.
- Points scored must be rounded off to the nearest 2 decimal places.
- In the event that two or more bids have scored equal total points, the successful bid must be the one scoring the highest number of points for specific goals.



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	(e) However, when functionality is part of the evaluation process and two or more bids have scored equal points including equal preference points for specific goals, the successful bid must be the one scoring the highest score for functionality. (f) Should two or more bids be equal in all respects, the award shall be decided by the drawing of lots. 3. POINTS AWARDED FOR PRICE THE 80/20 PREFERENCE POINT SYSTEMS A maximum of 80 points is allocated for price on the following basis: 80/20 $P_s = 80 \left(1 - \frac{P_t - P_{\min}}{P_{\min}} \right)$ Where Ps = Points scored for comparative price of bid under consideration Pt = Comparative price of bid under consideration Pmin = Comparative price of lowest acceptable bid
C.3.12	Add the following to the clause: “Accept that the submission of a Tender shall be construed as an acknowledgement by the Tenderer that they are satisfied with the insurance cover, the Employer will affect under the contract.”
C.3.13.1	Add to the existing clause: Tender offers will only be accepted if: - the tenderer submits a valid SARS tax Compliance status Pin for tenders issued by the South African Revenue Services or has made arrangements to meet outstanding tax obligations; - Proof of CSD registration ie MA number; - the tenderer submits a letter of intent from an approved insurer undertaking to provide the Demand Performance Guarantee to the format included in Part T2.2.22 of this procurement document - the tenderer is registered with the Construction Industry Development Board in an appropriate contractor grading designation; - the tenderer or any of its directors/shareholders is not listed on the Register of Tender Defaulters in terms of the Prevention and Combating of Corrupt Activities Act of 2004 as a person prohibited from doing business with the public sector; - the tenderer has not: - abused the Employer's Supply Chain Management System; or - failed to perform on any previous contract and has been given a written notice to this effect;



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	g) the tenderer has completed the Compulsory Enterprise Questionnaire and there are no conflicts of interest which may impact on the tenderer's ability to perform the contract in the best interests of the Employer or potentially compromise the tender process and persons in the employ of the state are permitted to submit tenders or participate in the contract; h) the tenderer is registered and in good standing with the compensation fund or with a licensed compensation insurer; i) the Employer is reasonably satisfied that the tenderer has in terms of the Construction Regulations, 2014, issued in terms of the Occupational Health and Safety Act, 1993, the necessary competencies and resources to carry out the work safely; and j) the tenderer: i) has sufficiently substantiated his experience in this type work; ii) has the required and experienced key personnel - iii)
C.3.17	The number of paper copies of the signed contract to be provided by the Employer is one.
	There are no additional conditions of tender.

--- END OF PART ---

Johannesburg Water (SOC) Ltd



VOLUME 1

RETURNABLE DOCUMENTS AND SCHEDULES

T2.1 T2.1 LIST OF RETURNABLE DOCUMENTS

The tenderer must complete the following returnable documents:

<u>Document</u>	<u>Page</u>
1. Returnable Schedules required for tender evaluation purposes	
T2.1.1 Record of addenda to tender documents	RD.2
T2.1.2 Certificate of Authority	RD.5
T2.1.3 Compulsory Enterprise Questionnaire	RD.10
T2.1.4 Preferential Procurement	RD.12
MBD 6.1 Preference points claim form in terms of the preferential procurement regulations	RD.13
MBD 4 Declaration of any potential conflict of interest	RD.21
MBD 8 Declaration of bidder's past Supply Chain management practices	RD.25
MBD 5 Declaration for Procurement above R10 Million (VAT Included)	RD.27
MBD 9 Certificate of independent bid determination	RD.29
T2.1.5 Proposed qualifications	RD.32
T2.1.6 Schedule of the Tenderer's experience	RD.33
T2.1.7 Contactable reference template	RD.35
T2.1.8 Schedule of key personnel	RD.35
T2.1.9 Curriculum vitae of key personnel	RD.37

T2.2 LIST OF RETURNABLE DOCUMENTS

<u>Document</u>	<u>Page</u>
2. Other documents required only for tender evaluation purposes	
T2.2.1 Certificate of Contractor Registration issued by the Construction Industry Development Board	RD.47
T2.2.2 SARS Tax Compliance Status Pin and Proof of CSD registration i.e. MA number	RD.48

T2.3 LIST OF RETURNABLE SCHEDULES

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

NOTE: The Tenderer is required to complete each and every schedule listed above to the best of his ability as the evaluation of tenders and the eventual contract will be based on the information provided by the tenderer.

T2.1 LIST OF RETURNABLE DOCUMENTS

<u>Document</u>	<u>Page</u>
1. Returnable Schedules required for tender evaluation purposes	
T2.1.1 Record of addenda to tender documents	RD.2
T2.1.2 Certificate of Authority	RD.5
T2.1.3 Compulsory Enterprise Questionnaire	RD.10
T2.1.4 Preferential Procurement	RD.12
T2.1.5 Proposed qualifications	RD.32
T2.1.6 Schedule of the Tenderer's experience	RD.33
T2.1.7 Contactable reference template	RD.35
T2.1.8 Schedule of key personnel	RD.35
T2.1.9 Curriculum vitae of key personnel	RD.37

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T2.1.1 Record of Addenda to Tender Documents

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

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

Attach additional pages if more space is required.

Signed Date

Name Position

Tenderer



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T2.1.2 Certificate of Authority

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

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

(I) Certificate For Company

I, ..., chairperson of the Board of Directors of
....., hereby confirm that by resolution of the Board
(copy attached) taken on, Mr/Ms, acting in the ca-
pacity of, was authorized to sign all documents in con-
nection with the tender for Contract No. JW14452 and any contract resulting from it on behalf
of the company.

Chairman:

As Witnesses: 1.....

2.....

Date:



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Contract No JW14452
Building Upgrade for the Mega warehouse in Langlaagte Depot



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(II) Certificate For Close Corporation

We, the undersigned, being the key members in the business trading as
..... hereby authorize Mr/Ms , acting in the capacity of
....., to sign all documents in connection with the
tender and any contract resulting from it on our behalf.

NAME	ADDRESS	SIGNATURE	DATE

Note : This certificate is to be completed and signed by all of the key members upon whom rests the direction of the affairs of the Close Corporation as a whole.

(III) Certificate For Partnership

We, the undersigned, being the key partners in the business trading as,

....., hereby authorize Mr/Ms,

acting in the capacity of, to sign all documents in connection

with the tender and any contract resulting from it on our behalf.

NAME	ADDRESS	SIGNATURE	DATE

Note : This certificate is to be completed and signed by all of the key partners upon whom rests the direction of the affairs of the Partnership as a whole.

(IV) Certificate For Joint Venture

This Returnable Schedule is to be completed by joint ventures.

We, the undersigned, are submitting this tender offer in Joint Venture and hereby authorise Mr/Ms , authorised signatory of the company , acting in the capacity of lead partner, to sign all documents in connection with the tender offer and any contract resulting from it on our behalf.

NAME OF FIRM	ADDRESS	DULY AUTHORISED SIGNATORY
Lead partner		Signature. Name Designation
		Signature. Name Designation
		Signature. Name Designation
		Signature. Name Designation

Note : This certificate is to be completed and signed by all of the key partners upon whom rests the direction of the affairs of the Joint Venture as a whole.



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(V) Certificate For Sole Proprietor

I, ..., hereby confirm that I am the sole owner of the Business
trading as

Signature of Sole owner:

As Witnesses:

1.....

2.

Date:

T2.1.3 Compulsory Enterprise Questionnaire

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

Section 1: Name of enterprise:

Section 2: VAT registration number, if any:

Section 3: CIDB registration number, if any:

Section 4: Particulars of sole proprietors and partners in partnerships

Name*	Identity number*	Personal income tax number*

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

Section 5: Particulars of companies and close corporations

Company registration number

.

Close corporation number

Proof of CSD registration ie MA xxxxxxxxx number.

SARS Tax Compliance status Pin number

Section 6: Record in the service of the state

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

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

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

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

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*insert separate page if necessary			
Section 7: Record of spouses, children and parents in the service of the state Indicate by marking the relevant boxes with a cross, if any spouse, child or parent of a sole proprietor, partner in a partnership or director, manager, principal shareholder or stakeholder in a company or close corporation is currently or has been within the last 12 months been in the service of any of the following: ☐ a member of any municipal council ☐ a member of any provincial legislature ☐ a member of the National Assembly or the National Council of Province ☐ a member of the board of directors of any municipal entity ☐ an official of any municipality or municipal entity ☐ an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act 1 of 1999) ☐ a member of an accounting authority of any national or provincial public entity ☐ an employee of Parliament or a provincial legislature			
Name of spouse, child or parent	Name of institution, public office, board or organ of state and position held	Status of service (tick appropriate column)	
		Current	Within last 12 months
*insert separate page if necessary			
The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise: i) authorizes the Employer to verify the tax compliance status from the South African Revenue Services that my / our tax matters are in order; ii) confirms that the neither the name of the enterprise or the name of any partner, manager, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears on the Register of Tender Defaulters established in terms of the Prevention and Combating of Corrupt Activities Act of 2004; iii) confirms that no partner, member, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears, has within the last five years been convicted of fraud or corruption; iv) confirms that I / we are not associated, linked or involved with any other tendering entities submitting tender offers and have no other relationship with any of the tenderers or those responsible for compiling the scope of work that could cause or be interpreted as a conflict of interest; and iv) confirms that the contents of this questionnaire are within my personal knowledge and are to the best of my belief both true and correct.			

Signed _____

Date _____

Name _____

Position _____

Enterprise name _____

T2.1.4 Preferential Procurement

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

Form No.	Form Title	Description	Page
MBD 6.1	Empowerment and Preferential Procurement	Procedures and adjudication criteria for the information of the Tenderer	RD.13
MBD 4	Declaration of any potential Conflict of Interest	Form to be completed by the Tenderer	RD. Error! Bookmark not defined.
MBD 8	Declaration of bidder's past supply chain management practices	Form to be completed by the Tenderer	RD.25
MBD 5	Declaration for Procurement above R10 Million (VAT Included)	Form to be completed by the Tenderer	RD.27
MBD 9	Certificate of Independent Bid Determination	Form to be completed by the Tenderer	RD.28

Note:

All information supplied must be current and valid. Proposed or imminent changes to a Tenderer's status may be mentioned but the declarations must reflect current circumstances.

MBD 6.1

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

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

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

1. GENERAL CONDITIONS

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

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

1.2 **To be completed by the organ of state**

(delete whichever is not applicable for this tender).

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

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

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

1.4 **To be completed by the organ of state:**

The maximum points for this tender are allocated as follows:

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

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

2. DEFINITIONS

- “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;
- “price”** means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts;
- “rand value”** means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;
- “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
- “the Act”** means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000).

3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1 POINTS AWARDED FOR PRICE

3.1.1 THE 80/20 PREFERENCE POINT SYSTEMS

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

80/20

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

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmin = Price of lowest acceptable tender

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

1.1.1. POINTS AWARDED FOR PRICE

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

80/20

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

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 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 preference point system

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will apply and that the lowest acceptable tender will be used to determine the applicable preference point system,

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

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

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

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

The specific goals allocated points in terms of this tender	Number of points allocated (80/20 system)	Number of points claimed (80/20 system) (To be completed by the tenderer)
Businesses located within the boundaries of Gauteng Province	6	
Business owned by 51% or more-Women	4	
Business owned by 51% or more- Black Youth	4	
Business owned by 51% or more - Black People who are military Veterans	2	
Business owned by 51% or more-Black People with Disabilities	4	
TOTAL	20	

5. DECLARATION WITH REGARD TO COMPANY/FIRM

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

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

5.3 TYPE OF COMPANY/ FIRM

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

[TICK APPLICABLE BOX]

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

- i) The information furnished is true and correct;
- ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;
- iii) In the event of a contract being awarded as a result of points claimed as shown in paragraphs 1.4 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct;
- iv) If the specific goals have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have –
 - (a) disqualify the person from the tendering process;
 - (b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;
 - (c) cancel the contract and claim any damages which it has suf-

ferred 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:	
	
	
	

1. SUB-CONTRACTING

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

(Tick applicable box)

YES		NO	

1.1.1 If yes, indicate:

- i) What percentage of the contract will be subcontracted _____ (minimum of 13%)
ii) The name of the sub-contractor(s):

.....

.....

.....

.....

iii) The black sharehold of the sub-contractor(s):

.....

.....

.....

.....

iv) Whether the sub-contractor(s) is an EME or QSE

(Tick applicable box)

YES		NO	

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

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

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Any EME		
Any QSE		

2. DECLARATION WITH REGARD TO COMPANY/FIRM

2.1 Name of company/firm:

2.2 VAT number registration number:

2.3 Company registration number:

2.4 TYPE OF COMPANY/ FIRM

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

[TICK APPLICABLE BOX]

2.5 DESCRIBE PRINCIPAL BUSINESS ACTIVITIES

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

2.6 COMPANY CLASSIFICATION

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

[TICK APPLICABLE BOX]

2.7 MUNICIPAL INFORMATION

Municipality where business is situated:

Registered Account Number:

Stand Number:

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

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

- v) The information furnished is true and correct;
- vi) In the event of a contract being awarded as a result of points claimed as shown in MBD 6.1, the contractor is required to furnish documentary proof as requested in the Tender Data to the satisfaction of the purchaser that the claims are correct;
- vii) If the specific goals points have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the purchaser may, in addition to any other remedy it may have –
 - (f) disqualify the person from the bidding process;
 - (g) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;
 - (h) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;
 - (i) recommend that the bidder or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted by the National Treasury from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and
 - (j) forward the matter for criminal prosecution.

WITNESSES

- 1.
- 2.

.....
SIGNATURE(S) OF BIDDERS(S)

DATE:

ADDRESS

.....
.....

MBD 4

DECLARATION OF INTEREST

1. No bid will be accepted from persons in the service of the state¹.
2. Any person, having a kinship with persons in the service of the state, including a blood relationship, may make an offer or offers in terms of this invitation to bid. In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons connected with or related to persons in service of the state, it is required that the bidder or their authorised representative declare their position in relation to the evaluating/adjudicating authority.
- 3 **In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**

3.1 Full Name of bidder or his or her representative:.....

3.2 Identity Number.....

3.3 Position occupied in the Company (director, trustee, shareholder²):.....

3.4 Company Registration Number:

3.5 Tax Reference Number:.....

3.6 VAT Registration Number:

3.7 The names of all directors / trustees / shareholders members, their individual identity numbers and state employee numbers must be indicated in paragraph 4 below.

3.8 Are you presently in the service of the state? **YES / NO**

3.8.1 If yes, furnish particulars.

.....

¹MSCM Regulations: "in the service of the state" means to be –

- (a) a member of –
 - (i) any municipal council;
 - (ii) any provincial legislature; or
 - (iii) the national Assembly or the national Council of provinces;
- (b) a member of the board of directors of any municipal entity;
- (c) an official of any municipality or municipal entity;
- (d) an employee of any national or provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No.1 of 1999);
- (e) a member of the accounting authority of any national or provincial public entity; or
- (f) an employee of Parliament or a provincial legislature.

² Shareholder" means a person who owns shares in the company and is actively involved in the management of the company or business and exercises control over the company.

3.9 Have you been in the service of the state for the past twelve months? YES / NO

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3.9.1 If yes, furnish particulars.....
.....

3.10 Do you have any relationship (family, friend, other) with persons
in the service of the state and who may be involved with
the evaluation and or adjudication of this bid? YES / NO

3.10.1 If yes, furnish particulars.....
.....

3.11 Are you, aware of any relationship (family, friend, other) between
any other bidder and any persons in the service of the state who
may be involved with the evaluation and or adjudication of this bid? YES / NO

3.11.1 If yes, furnish particulars
.....
.....

3.12 Are any of the company's directors, trustees, managers,
principle shareholders or stakeholders in service of the state? YES / NO

3.12.1 If yes, furnish particulars.....
.....

3.13 Are any spouse, child or parent of the company's directors
trustees, managers, principle shareholders or stakeholders
in service of the state? YES / NO

3.13.1 If yes, furnish particulars.....
.....

3.14 Do you or any of the directors, trustees, managers,
principle shareholders, or stakeholders of this company
have any interest in any other related companies or
business whether or not they are bidding for this contract. YES / NO

3.14.1 If yes, furnish particulars:.....
.....

4.Full details of directors / trustees / members / shareholders.

Full Name	Identity Number	State Employee Number

.....
Signature

.....
Date

.....
Capacity

.....
Name of Bidder

MBD 8

DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

- 1 The bid of any bidder may be disregarded if that bidder, or any of its directors have-
 - a. abused the institution's supply chain management system;
 - b. committed fraud or any other improper conduct in relation to such system; or
 - c. failed to perform on any previous contract.
- 2 **In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**

Item	Question	Yes	No
4.1	Is the bidder or any of its directors listed on the National Treasury's database as companies or persons prohibited from doing business with the public sector? (Companies or persons who are listed on this database were informed in writing of this restriction by the National Treasury after the <i>audi alteram partem</i> rule was applied).	Yes ☐	No ☐
4.1.1	If so, furnish particulars:		
4.2	Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? To access this Register, enter the National Treasury's website, www.treasury.gov.za, click on the icon "Register for Tender Defaulters" or submit your written request for a hard copy of the Register to facsimile number (012) 3265445.	Yes ☐	No ☐
4.2.1	If so, furnish particulars:		
4.3	Was the bidder or any of its directors convicted by a court of law (including a court outside of the Republic of South Africa) for fraud or corruption during the past five years?	Yes ☐	No ☐
4.3.1	If so, furnish particulars:		
4.4	Was any contract between the bidder and any organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes ☐	No ☐
4.4.1	If so, furnish particulars:		



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CERTIFICATION

I, THE UNDERSIGNED (FULL NAME).....

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

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

.....

Signature

.....

Date

.....

Position

.....

Name of Bidder



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MBD 5

DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (VAT INCLUDED)

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

1. Are you by law required to prepare annual financial statements for auditing?

YES / NO

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

.....

.....

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

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

Do you have any outstanding undisputed commitments for municipal services towards a municipality or any other service provider in respect of which payment is overdue for more than 30 days?

YES / NO

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

- 2.2 If yes, provide particulars.

.....

.....

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

YES / NO

3.1 If yes, furnish particulars

.....
.....

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

YES / NO

4.1 If yes, furnish particulars

.....
.....

CERTIFICATION

I, THE UNDERSIGNED (NAME)

.....

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

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

FALSE.

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

MBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

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

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

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

MBD 9 CERTIFICATE OF INDEPENDENT BID DETERMINATION

I, the undersigned, in submitting the accompanying bid:

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

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

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

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

³ Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.



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

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder



T2.1.6 Schedule of the Tenderer's Experience

Signed _____ Date _____

Position

NAME	ADDRESS
<i>Tenderer</i>	



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T2.1.7 Contactable Reference Template

To Johannesburg Water (SOC) Ltd

I, the undersigned being duly authorised to do so, hereby furnish a reference to Johannesburg Water relative to tender Contract No. **JW14452-BUILDING UPGRADE FOR THE MEGA WAREHOUSE IN LANGLAAGTE DEPOT**

Name of Tenderer:

Name of Project:

Description of Services provided in Commercial / Industrial Building Construction projects.

.....
.....

Contract Value (R).....Floor Area of the Building (M²).....

Name of Client Company

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

.....

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

Signature of authorized person/Referee: Date

Telephone/Mobile of authorized person/Referee:

Email address of authorized person/Referee:

NB: This document must be completed by the referee and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.

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



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T2.1.7 Contactable Reference Template

To Johannesburg Water (SOC) Ltd

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Name of Project:

Description of Services provided in Commercial / Industrial Building Construction projects.

.....
.....

Contract Value (R).....Floor Area of the Building (M²).....

Name of Client Company

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

.....

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

Signature of authorized person/Referee: Date

Telephone/Mobile of authorized person/Referee:

Email address of authorized person/Referee:

NB: This document must be completed by the referee and included in the tender submission. Alternatively, the client's letterhead may be used for this purpose provided it complies with the functional criteria requirements. A separate form must be completed for each reference as required in the evaluation criteria. Information provided will be verified and if found to be false or misrepresented, punitive measures will be instituted against the respective party including blacklisting and restriction from participating in any future government tender.

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

T2.1.8 Schedule of Key Personnel

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

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

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

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

DATE:

T2.1.9 Curriculum Vitae of Key Personnel

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

Proposed role in the project	Contracts Manager

1. Surname	
2. First Name	

3. Education (Submit certified copies of qualifications)

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

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

Institution/ Professional Body	Category of Registration	Registration Number

5. Post Qualification Experience

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

6. Project-based Experience (Post Qualification experience required for all below-listed projects)

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

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

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

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



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

Duplicate relevant section to add more information, if required.

Certification:

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

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

.....
Date



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Proposed role in the project	Construction Manager

1. Surname	
2. First Name	

3. Education (Submit certified copies of qualifications)

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

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

Institution/ Professional Body	Category of Registration	Registration Number

5. Post Qualification Experience

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

6. **Project-based Experience (Post Qualification experience required for all below-listed projects)**

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

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

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

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

Duplicate relevant section to add more information, if required.

Certification:

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

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

.....
Date

Proposed role in the project	Safety Officer

1. Surname	
2. First Name	

3. Education (Submit certified copies of qualifications)

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

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

Institution/ Professional Body	Category of Registration	Registration Number

5. Post Qualification Experience

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

6. Project-based Experience (Post Qualification experience required for all below-listed projects)

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

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

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

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



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Volume 1 Tender and Contract
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Project Name and Client	
Project Dates and Value	
Project position (e.g. Contract Manager, Construction Manager, etc.)	
Description of Scope and Duties	

Duplicate relevant section to add more information, if required.

Certification:

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

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

.....
Date



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Volume 1 Tender and Contract
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T2.2 LIST OF RETURNABLE DOCUMENTS

<u>Document</u>	<u>Page</u>
2. Other documents required only for tender evaluation purposes	
T2.2.1 Certificate of Contractor Registration issued by the Construction Industry Development Board	RD.47
T2.2.2 SARS Tax Compliance Status Pin and Proof of CSD registration i.e. MA xxxxxxxxxxxx number	RD.48

T2.2.1 Contractor's Certificate of Registration With CIDB

NB: The Tenderer shall attach hereto the Contractor's Certificate of Registration with CIDB OR provide the CIDB registration number that JW can use to verify CIDB require-ments for this tender.

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

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

SIGNATURE:.....

DATE:

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

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

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

SIGNATURE:.....

DATE:

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

T2.3 LIST OF RETURNABLE SCHEDULES

Document

Page

3. Returnable Schedules that will be incorporated into the contract

T2.3.1	Imported content sheet: forward exchange cover for imported goods	RD.50

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

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

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

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

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

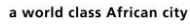
Exchange rate(s) as at (insert date)

Country	Exchange Rate

SIGNED ON BEHALF OF TENDERER :

NAME (in print) :

DATE :



Equipment Schedule

RD.51

Returnable Documents

T2.4 LIST OF RETURNABLE SCHEDULES

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

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

DECLARATION BY CONTRACTOR

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

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

We furthermore commit to:

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

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

Name of tenderer	
Name of Authorized person	
Authorized Signature*	

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

DECLARATION BY CONTRACTOR

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

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

DRAWING NUMBER	DESCRIPTION	REV
NAME BOARD		
ECS328-GEN-001	PROJECT NAME BOARD INFORMATION	A
ARCHITECTURAL		
ECS328-Arch-001	Detailed Layout of Refurbishments and Upgrades at Mega store, Overflow and workshop buildings	A
ECS328-Arch-002	Mega Store Building Sections	A
ECS328-Arch-003	Existing Plan Layout for Demolitions	A
ECS328-Arch-004	Mega Store Elevations	A
STRUCTURAL		
ECS328-STR-005	Ablution Block Layout And Typical Strip Foundation Details	A
ECS328-STR-004	Surface Bed Layout And Detail	A
ROADS AND STORM WATER		
ECS328-SW-001	Roads and Storm water General Layout and Details	A
ECS328-TR-001	Paving Setting Out	A
ELECTRICAL		
ECS328/E-001	Lighting Layout	A
ECS328/E-002	Small power layout	A
ECS328/E-003	Wiring Channel and Wire Mesh Layout	A
ECS328/E-004	Earthing System Layout	A
ECS328/E-005	Lightning protection System	A
ECS328/E-006	CCTV System Layout	A
ECS328/E-007	Access Control System Layout	A

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DRAWING NUMBER	DESCRIPTION	REV
ECS328/E-008	Intruder Alarm System Layout	A
MECHANICAL		
ECS328/M-001	Mechanical - HVAC	A
ECS328/M-001	Mechanical – Wet Services preliminary layout	A
ECS328/M-001	Mechanical – Fire Services Preliminary Sketch	A

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

Name of tenderer	
Name of Authorized person	
Authorized Signature*	



CONTRACT JW14452

BUILDING UPGRADE FOR THE MEGA WAREHOUSE

IN LANGLAAGTE DEPOT

VOLUME 1

PART C1: AGREEMENT AND CONTRACT DATA



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Employer:		Contractor:	
Witness:		Witness:	



C1.1 FORM OF OFFER (AGREEMENT)

C1.1.1 FORM OF OFFER

THE TENDERER IS TO COMPLETE AND SIGN THE FORM OF OFFER

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

JW14452 – BUILDING UPGRADE FOR MEGA STORE IN LANGLAAGTE DEPOT

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

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

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

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

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

Signature(s)

Name(s)

Capacity

For the Tenderer

(Name and address of organisation)

**Name and
signature of
witness**

_____ **Date** _____

Employer:		Contractor:	
Witness:		Witness:	



C1.1.2 FORM OF ACCEPTANCE

THE EMPLOYER IS TO COMPLETE AND SIGN THE FORM OF ACCEPTANCE

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

The terms of the contract are contained in

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

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

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

The Tenderer shall within 28 days after receiving a completed copy of this Agreement, including the Schedule of Deviations (if any), contact the Principal Agent (whose details are given in the Contact Data) to arrange the delivery of any bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the Conditions of Contract identified in the Contract Data at, or just after, the date of this Agreement comes into effect. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this Agreement.

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

FOR EMPLOYER OFFICIAL USE ONLY

Signature(s)

Name(s)

Capacity

For the
Employer

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

(Name and address of organisation)

Name and
signature of
witness

_____ Date _____

Employer:		Contractor:	
Witness:		Witness:	

C1.1.3 SCHEDULE OF DEVIATIONS

Notes:

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

1 Subject _____

Details _____

2 Subject _____

Details _____

3 Subject _____

Details _____

4 Subject _____

Details _____

5 Subject _____

Details _____

6 Subject _____

Details _____

7 Subject _____

Details _____

8 Subject _____

Details _____

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

Employer:		Contractor:	
Witness:		Witness:	



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

For the Tenderer:

Signature(s)

Name(s)

Capacity

(Name and address of organisation)

**Name and
signature of
witness**

Date _____

For the Employer:

Signature(s)

Name(s)

Capacity

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

(Name and address of organisation)

**Name and
signature of
witness**

Date _____

Employer:		Contractor:	
Witness:		Witness:	

C1.2 CONTRACT DATA

C1.2.1 PART 1: DATA PROVIDED BY THE EMPLOYER

CONDITIONS OF CONTRACT

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

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

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

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

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

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

Employer:		Contractor:	
Witness:		Witness:	



C1.2.2 CONTRACT DATA EC (Employer to Contractor)

Employer Addendum Code 2101-EC

FOR INFORMATION ONLY, TO BE SIGNED ON APPOINTMENT

Introduction

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

Definitions

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

Provision of Contract Data

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

Reference Clauses

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

Employer:		Contractor:	
Witness:		Witness:	

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3.0	INSURANCES AND SECURITIES
4.0	PRACTICAL COMPLETION DATES AND PENALTIES
5.0	DOCUMENTS AND GENERAL
6.0	CHANGES MADE TO THE STANDARD JBCC DOCUMENT
7.0	DECLARATION BY THE PRINCIPAL AGENT

CONTRACT DATA – EMPLOYER

1.0 CONTRACTING AND OTHER PARTIES

1.1 [1.2]	Employer:	Johannesburg Water (Pty) Ltd		
	Postal Address:	PO Box 61542, Marshalltown	Code:	2107
	Physical Address:	65 Ntemi Piliso Street, Newtown, Johannesburg	Code:	2107
	Tel no.:	+27 11 688 1671	E-mail:	william.chitsa@jwater.co.za
	Fax no.:		Person:	William Chitsa
	VAT no.:	4270191077		
1.2 [5.1]	Principal Agent:	Lesedi Technical Engineering	Person:	Kizito Mudzamiri
	Postal Address:	Postnet Suite No.326, Private Bag X26, Sunninghill	Code:	2157
	Tel no.:		E-mail:	Kizitom@leseditechnical.com
	Fax no.:			
1.3 [5.2]	Agent (1):	Lesedi Technical Engineering	Person:	Reitumetse Khabele
	Agent's Service:	Quantity Surveyor		
	Postal Address:	Postnet Suite No.326, Private Bag X26, Sunninghill	Code:	2157
	Tel no.:		E-mail:	reitumetsek@leseditechnical.com
	Fax no.:			
1.4 [5.2]	Agent (2):	Lesedi Technical Engineering	Person:	Wade Chanakira
	Agent's Service:	Electrical Engineer		
	Postal Address:	Postnet Suite No.326, Private Bag X26, Sunninghill	Code:	2157
	Tel no.:		E-mail:	wadec@leseditechnical.com
	Fax no.:			

Employer:		Contractor:	
Witness:		Witness:	



1.5	Agent (3):	Lesedi Technical Engineering	Person:	Sifiso Dube
[5.2]	Agent's Service:	Civil/Structural Engineer		
	Postal Address:	Postnet Suite No.326, Private Bag X26, Sunninghill	Code:	2157
	Tel no.:		E-mail:	sifisod@leseditechnical.com
	Fax no.:			

1.6	Agent (4):	Lesedi Technical Engineering	Person:	Ntombi Chisale
[5.2]	Agent's Service:	Architect		
	Postal Address:	Postnet Suite No.326, Private Bag X26, Sunninghill	Code:	2157
	Tel no.:		E-mail:	
	Fax no.:			

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

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

2.0 CONTRACT AND SITE INFORMATION

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

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

2.3	Site description:	JW Langlaagte Depot, 2 Link Road in Langlaagte, Johannesburg
[1.1]		

2.4	Possession of the site is to be given on:	(Date)	Within 5 (five) working days after receipt of documentary evidence that: • Insurances have been effected [12.2]; • Security has been provided to the Employer [14.1]; • Contractor's Lien has been signed; • Safety Plan has been approved by the Employer.
[1.5.2.1]			

2.5	Period for the commencement of the works after the contractor takes possession of the site :	(working days)	7 (Seven)
[15.3]			

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

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

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

Employer:		Contractor:	
Witness:		Witness:	

2.9 [16.4]	Geotechnical investigation of the site has been undertaken. Where “yes” the results are included in the contract documents .			(yes/no)	No (Addendum A)
2.10 [16.6]	Existing premises will be occupied. Where “yes” the specific requirements are described below or detailed in the contract documents .			(yes/no)	No
2.11 [16.7]	Provision of temporary services is required. Where “yes” the specific requirements are described below or detailed in the contract documents .			(yes/no)	Yes
2.11.1	Water	Option A Option B Option C	Contractor – his cost Employer – free of charge Contractor – metered (contractor cost)	(A, B or C)	A
2.11.2	Electricity	Option A Option B Option C	Contractor – his cost Employer – free of charge Contractor – metered (contractor cost)	(A, B or C)	A
2.11.3	Telecom	Option A Option B Option C	Contractor – his cost Employer – free of charge Contractor – metered (contractor cost)	(A, B or C)	A
2.11.4	Ablutions	Option A Option B Option C	Contractor – his cost Employer – free of charge Contractor – metered (contractor cost)	(A, B or C)	A
2.12 [16.8]	Protection of existing trees and shrubs is required. Where “yes” the specific requirements are described below or detailed in the contract documents .			(yes/no)	No

3.0 INSURANCE AND SECURITIES

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

Employer:		Contractor:	
Witness:		Witness:	



[10.1.3],
[12.6]

For the sum of: (Amount)

R1,000,000-00

With a deductible of: (Amount)

Minimum of
R10,000-00

3.4
[11.1.1]

Support insurance to be effected by: (Employer / Contractor)

Contractor

For the sum of: (Amount)

N/A

With a deductible of: (Amount)

N/A

3.5
[11.1.2-3],
[12.1]

Special insurance to be effected by: (Employer / Contractor)

Contractor

Type:

N/A

For the sum of: (Amount)

N/A

With a deductible of: (Amount)

N/A

4.0 PRACTICAL COMPLETION DATES AND PENALTIES

4.1
[24.3.1],
[30.1-36]

For the **works** as a whole:
The date for **practical completion** and the
penalty per calendar day is:

Date

8 months from the
date of site
handover excluding
all statutory
holidays and
building holiday
period

Penalty Amount

R 7 500 / day

Or

4.2
[24.3.1],
[28.1]

For the **works** in **sections**:
The date for **practical completion** and the
penalty per calendar day is:

Date

N/A

Penalty Amount

N/A

5.0 DOCUMENTS AND GENERAL

5.1
[3.7]

Construction document copies to be supplied to the **contractor** free of charge.

(No. of copies)

3

5.2
[3.9]

The **priced document** may be used as a specification of **materials and goods** and work methods.

(yes / no)

No

5.3
[3.10]

The **contractor** shall provide a schedule of rates. (yes/no)

No

(Addendum No.)

N/A

5.4

Changes made to **JBCC** standard documents. (yes/no)

Yes

(Addendum No.)

Item 6

Employer:		Contractor:	
Witness:		Witness:	



[3.11]

5.5
[15.1.1]

On acceptance of the tender the **priced document** is to be submitted within the stated **working days**.

(No. of days)

5.6
[22.2]

Work to be undertaken by **direct contractors**. (yes/no)

(Addendum No.)

5.7
[24.9]

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

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

5.8
[31.1]
5.9
[4.1]

Interim **payment certificate** to be issued by:

(Date of Month)

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

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

6.0

CHANGES MADE TO THE STANDARD JBCC DOCUMENT

Note: All changes in detail must be listed below or provided in:

(Addendum No.)

Employer:		Contractor:	
Witness:		Witness:	

C1.2.3 CHANGES TO JBCC PBA

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40.0	DISPUTE
41.0 – 42.0	CONTRACT AGREEMENT

DEFINITIONS

Clause 1.0: Definitions and Interpretation

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

Employer:		Contractor:	
Witness:		Witness:	

OBJECTIVE AND PREPARATION

Clause 2.0: Offer, Acceptance and Performance Obligations

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

Clause 3.0: Documents

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

Clause 4.0: Design Responsibility

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

Clause 5.0: Principal Agents

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

Clause 6.0: Contractor's Site Representative

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

Clause 7.0: Compliance with Laws and Regulations

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

Clause 8.0: Works Risk

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

Clause 9.0: Indemnities

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

Clause 10.0: General Insurances

	<i>Insurance to be taken out by the Contractor</i>

Clause 11.0: General Insurances

	<i>Insurance to be taken out by the Contractor</i>

Clause 12.0: Effecting Assurances

	<i>Insurance to be taken out by the Contractor</i>

Clause 13.0: Assignment

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

Employer:		Contractor:	
Witness:		Witness:	

Clause 14.0: Security

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

EXECUTION

Clause 15.0: Preparation for and Execution of the Works

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

Clause 16.0: Site and Access

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

Clause 17.0: Contract Instructions

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

Clause 18.0: Setting out of the Works

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

Clause 19.0: Temporary Works and Plant

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

Clause 20.0: Nominated Sub-contractors

	<i>The Service Provider shall in addition to clause 20 for monitoring purposes, keep monthly records and transmit to the Client data on the following indicators on a date set by the Employer with regard to all projects implemented:</i> <i>• Project budget and planned output according to EPWP requirements</i> <i>• Actual Project Expenditure and actual output according to EPWP requirements</i> <i>• Planned and achieved labour intensity</i> <i>• Number of work opportunities created</i> <i>• Demographics of workers employed (disaggregated by women, youth and persons with disabilities)</i> <i>• Wage rate earned on project</i> <i>• Number of person-days of employment created</i> <i>• Copies of Certified Identity documents of workers</i> <i>• Attendance Register in the format provided for by the Employer,</i> <i>• Proof of Payment for all qualifying EPWP Labour.</i> <i>• Signed contracts between contractors and Labourers.</i> <i>• Proof of (Unemployment Insurance Fund) UIF deductions.</i> <i>• Proof of good standing with the Compensation for Occupational Injuries and Diseases ACT (COIDA)</i> <i>• Number of persons who have attended training including the nature and duration of training provided</i> <i>• Assets created, rehabilitated or maintained in accordance with indicators in the EPWP M & E Framework</i>

Employer:		Contractor:	
Witness:		Witness:	

	- Services provided or delivered in accordance with indicators in the EPWP M & E Framework <i>In addition to reporting requirements for the purpose of Work Opportunities created. The service provider shall structure all construction contracts to allow for the development of EME designated Contractors (which will be procured in line with the Employer's Supply Chain Management Policies) and keep monthly records and transmit to the Client data on the following indicators on a date set by the Employer with regard to all projects implemented:</i> - Project budget and planned output in terms of work packages set aside for subcontracting. - Actual Project Expenditure and actual output according as pare templates issued by the Employer. - Keep Record of EPWP job opportunities created through Targeted Enterprise engagement. - BEE certification of EMEs - CIDB Registration of EME's - Letter of Good Standing with Department of Labour, - Company Registration of EME.s - Appointment Letter and Contract with Lead Contractor.

Clause 21.0: Selected Sub-contractors

	No change from Principal Building Agreement

Clause 22.0: Employer's Direct Contractors

	No change from Principal Building Agreement

Clause 23.0: Contractor's Domestic Sub-contractors

	No change from Principal Building Agreement

Clause 23 (b) Local Sub-contractors

	Special Conditions <i>The successful Tenderer must subcontract a minimum of 13% of the value of this Contract to an entity(s) described below. The value of the Contract for the purposes of this calculation shall be equal to the Contract Price (excluding VAT) as described in the General Conditions of Contract/JBCC.</i> <i>The successful Tenderer must subcontract a minimum 13% of the Contract value, the following areas of work have been identified for subcontracting:</i> - External Works; - Building Alterations <i>The subcontractor/s chosen for this purpose must be registered on National Treasury's Central Supplier Database (CSD) and must be from one of the following designated groups:</i> - An EME or QSE which is at least 51% owned by black people;

Employer:		Contractor:	
Witness:		Witness:	

	• An EME or QSE which is at least 51% owned by black people who are youth; • An EME or QSE which is at least 51% owned by black women; • An EME or QSE which is at least 51% owned by black people with disabilities; • An EME or QSE which is 51% owned by black people living in rural or underdeveloped areas or townships; • A cooperative which is at least 51% owned by black people; • An EME or QSE which is at least 51% owned by black people who are military veterans; • an EME or QSE . 1. Subcontractors must be chosen from National Treasury's Central Supplier Database which can be accessed on National Treasury's website. 2. Provision was made for subcontracting in the Bill of Quantities. Subcontracting activities are indicated in the Bill of Quantities. Where the provision for subcontracting is less than the minimum subcontracting requirement, the Contractor will identify additional subcontracting items or tasks that will meet the subcontracting minimum of 13% of the value of this Contract. In complying with this condition, the following shall be adhered with: • The Contractor shall develop a Subcontracting Plan that sets out the details of the proposed Subcontracting arrangements including, but not limited to, competitive bidding process to be used for the appointment of SMME's, scope of work to be allocated, criteria for the selection of Subcontractor(s), Subcontractor agreements, cost of the work to be Subcontracted, etc. • The Subcontracting Plan shall be issued to the Principal Agent for approval, prior to the engagement of any Subcontractor(s) by the Contractor. The activities, time periods, linkages, etc. associated with the development and approval of the Subcontracting Plan shall be included in the Project Programme, which Programme is subject to the approval of the Principal Agent. • Where the identified items for subcontracting do not form 13% of the Contract Price, the Contractor shall identify additional works that will be subcontracted to ensure compliance with the minimum subcontracting percentage • In the event that a rate supplied by the Contractor for a specific BoQ work item is not sufficient to cover Subcontractor costs/rates for that specific item, the Contractor shall provide a detailed rate breakdown for that specific BoQ item (and each and every subsequent BoQ work item where the rate is not sufficient to cover Subcontractor cost); and shall indicate costs (amongst others) for labour, material, handling, mark-ups, etc. to prove that the rate that was submitted during tender stage was in fact market related; and in balance with other rates that were submitted for work items that will not be undertaken by Subcontractors. • Should any delays be experienced during the period of the Contract due to the appointment of subcontractors by the Contractor, work stoppages by subcontractors, industrial action by subcontractors, etc. such delays shall be assigned to the Contractor, and no claims for Extension of Time will be entertained by the Employer. • The Contractor will be liable to pay a penalty if the Subcontracting target of 13% has not been met by the end of the Contract. The Employer will deduct this penalty amount through the Payment Certificate process (Credit Note). The Employer will have full discretion as to when the penalty will be applied (i.e. the

Employer:		Contractor:	
Witness:		Witness:	

	month in which the penalty amount will be deducted). In calculating the total amount that has been (will be) paid to SMME's, all amounts that have actually been reimbursed to SMME's will be taken into account including P&G's, amounts for actual work done, etc. • The penalty for failing to achieve the monetary value of the target set by the Employer for contract participation by Targeted Enterprises and local SMME Contractors in terms of the Scope of Works is 50% of the monetary value by which the achieved monetary value falls short of the target monetary value. • If the Contractor fails to complete the latter more than three incidents and should the Employer or his duly authorised representative find that the Contractor is hindering his (the Employer's) deliverables to senior management, he shall reserve the right to: • terminate the Contract 3.A Subcontracting agreement between the Main Contractor and the Subcontractor shall be submitted to JW upon appointment and must include the following minimum information: • Name of Subcontractor and BBBEE status • Subcontractor domicilium and registered address of business, as well as status of compliance with all applicable legal requirements. • Area and location of project • Scope of Work issued to the Subcontractor • Value of the Work issued including P&G's (this information must be submitted in a format that is readily auditable). • Assistance provided/to be provided to the Subcontractor by the Contractor, e.g. acquisition of materials, machinery, tools, etc. • Indicate the remuneration rate of all local labourers (the latest Gazetted labour rates) • A Skills Transfer Plan which will indicate, amongst others, the proposed skills that will be transferred to the Subcontractor, individuals that will be identified for skills transfer, the amount that will be spent by the Contractor on skills transfer, evidence that will be produced by the Contractor (such as training certificates, training registers, etc.), etc. • A specific provision that enables the Contractor to pay the Subcontractor's suppliers, labour (skilled, local, etc.) or any other service provider of the Subcontractor, should the Subcontractor fail to do so. This provision shall include (but not be limited to) the following conditions/proviso's: ○ Invoices that are due for payment from suppliers and the like must be invoices that have been approved for payment and be based on work or services that have actually been completed or delivered. Payments that are due to labour will be based on approved timesheets. ○ The Contractor is to ensure that any invoice presented for payment is indeed an approved invoice, and that the necessary work or services have been delivered or completed. The approved invoice shall be settled (paid) by the Contractor (on behalf of the Subcontractor) by the due date for payment.

Employer:		Contractor:	
Witness:		Witness:	

	○ The Contractor will be entitled to deduct payments made to any third party, on behalf of the Subcontractor, from subsequent payments that may become due to the Subcontractor. ○ The Contractor will be entitled to bill the Subcontractor a mark-up on the payments made on behalf of the sub-contractor. The mark-up shall not be more than 10% (ten percent) of the amount actually paid (i.e. the amount (excluding VAT) reflected on the invoice that has been settled). The mark-up amount shall be deducted from subsequent payments that may become due to the Subcontractor. ○ Proof of any such payments made on behalf of the Subcontractor shall be issued to the Principal Agent, on request, with all necessary supporting information that the Principal Agent may request ○ Payments made on behalf of the Subcontractor are not subject to the Contractor first being paid by the Employer. Therefore, the Contractor shall pay approved invoices, on behalf of the Subcontractor, irrespective of whether the Contractor has first been paid by the Employer. The Contractor will be entitled to levy interest on all payments that have been made in this regard, in accordance with the necessary interest payment provisions contained in the General and Special Conditions of Contract. 4.The successful Contractor shall submit periodic SMME/Subcontractor reports to the Principal Agent as follows: • Status of progress against the Subcontracting Plan (described above), to the approval of the Principal Agent • Subcontractor domicilium and registered address of business, as well as ongoing status of compliance with all applicable legal requirements. • Name of Subcontractor and BBBEE status • Area and location of project • Scope of work issued to the Subcontractor • Value of the work issued (this information must be submitted in a format that is readily auditable) • Monthly payments made to the subcontractor (this information must be submitted in a format that is readily auditable) • Assistance provided to the Subcontractor e.g. advance payments, acquisition of materials, machinery, tools, etc. • Performance of the Subcontractor, with evidence to support this performance assessment. 5.Upon completion of the project, the Contractor is required to provide a final report to JW on skills transferred to / acquired by the Subcontractor(s) engaged on the Project, description and value of work performed, as well as their overall performance. 6.The Contractor shall also indicate whether the experience gained by the Subcontractor is sufficient to assist the Subcontractor to improve their CIDB grading, with full details of supporting information.

Employer:		Contractor:	
Witness:		Witness:	

COMPLETION

Clause 24.0: Practical Completion

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

Clause 25.0: Works Completion

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

Clause 26.0: Final Completion

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

Clause 27.0: Latent Defects Liability Period

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

Clause 28.0: Sectional Completion

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

Clause 29.0: Revision of Date for Practical Completion

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

Clause 30.0: Penalty for Late or completion

	<i>In addition to clause 30, during the Contract Period should the Contractor:</i> a) Fail to report <i>The Employer shall levy a penalty on Contractor, should the latter fail to provide reporting as required in C1.2.1.2.6, C1.2.1.2.14 and the specification highlighted in the Scope of Work, with regard to content and frequency, whilst as per the Pricing Data section no payment for work completed shall be processed.</i> <i>The penalty value shall be R5,000.00 per report per occasion; and</i> <i>If the Contractor fails to complete the aforementioned more than three incidents and should the Employer or his duly authorised representative find that the Contractor is hindering his (the Employer's) deliverables to JW Senior Management, he shall reserve the right to:</i> <i>i. perform the Works internally or through another Contractor; and</i> <i>ii. deduct additional costs incurred by the Employer from monies owed to the Contractor or from the Contractor's Guarantee. Additional costs incurred by the Employer shall include all claims from Contract affected parties, claims such as but not be limited to</i>

Employer:		Contractor:	
Witness:		Witness:	

claims from customers, any costs associated with the loss of water, and all costs associated with the procurement of an alternative Contractor.
iii. terminate the Contract.

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

b) Fail to pay any labour or SMME

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

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

c) Failure to meet target participation by local SMME

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

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

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

Monthly compliance rating will be calculated for each Contractor as per a formula determined by the Employer focusing on or incorporating outcomes of assurance (e.g. monthly audit), operational (e.g. behavioural based safety inspection) assessments and other requirements, as necessary.

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

Employer:		Contractor:	
Witness:		Witness:	

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

PAYMENT

Clause 31.0: Interim Payment

Clause	Data
31.9	<i>Replace Sub-clause 31.9 with the following:</i> <i>Payment shall be made upon:</i> <i>The Contractor will provide a payment certificate with quantities to the Principal Agent before or on the 20th of every month.</i> <i>After the payment certificate has been approved by Principal Agent, the Contractor must issue an Original Tax Invoice compliant with SARS requirements for Valid Tax Invoice. The date of the Original Tax Invoice must be the date the Principal Agent approved the Payment Certificate. The certificate will then be ready for handing in to the Employer.</i> <i>Payment will be made within 60 days of approved invoice date.</i> <i>Payment shall be subject to the Contractor submitting an Original Tax Invoice compliant with SARS requirements for Valid Tax Invoice to the Employer for the amount due. Any dissatisfaction in respect of such payment certificate shall be dealt with in terms of Clause 40.1.</i> <i>The maximum percentage retention on the amounts due to the Contractor is 10% of the Contract Sum</i> <i>-Replace Clause 31.10 & 31.11 of the JBCC – No interest for late payments will be paid by the Employer.</i>

Employer:		Contractor:	
Witness:		Witness:	

	<i>-Replace Clause 31.15 - No suspension of works due to delayed or non-payment from the Employer.</i>

Clause 32.0: Adjustment to the Contract Value

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

Clause 33.0: Recovery of Expense and Loss

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

Clause 34.0: Final Account and Final Payment

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

Clause 35.0: Payment to other Parties

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

TERMINATION

Clause 36.0: Termination by Employer – Contractor's Default

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

Clause 37.0: Termination by Employer – Loss and Damage

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

Clause 38.0: Termination by Contractor – Employer's Default

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

Clause 39.0: Termination – Cessation of the Works

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

DISPUTE

Clause 40.0: Settlement of Disputes

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

CONTRACT AGREEMENT

Employer:		Contractor:	
Witness:		Witness:	

Clause 41.0: Post Tender Provisions

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

Clause 42.0: Contractual Agreement

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

Employer:		Contractor:	
Witness:		Witness:	



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

(1) **Employer:**

Physical Address:

Tel No: Fax No:

E-mail:

Tax/VAT No.:

(2) **Contractor:**

Physical Address:

Tel No: Fax No:

E-mail:

Tax/VAT No.:

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

In words:

.....

43.4 Signature of the contracting **parties**:

FOR THE EMPLOYER:

THUS, DONE AND SIGNED AT ON THIS DAY

OF 20.....

.....
Name of signatory

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

.....
Capacity of signatory

.....
as Witness (1)

Employer:		Contractor:	
Witness:		Witness:	



Details of Witness (1)

Name:

Address:

.....

FOR THE CONTRACTOR:

THUS, DONE AND SIGNED AT ON THIS DAY

OF 20.....

.....
Name of signatory

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

.....
Capacity of signatory

.....
as Witness (2)

Details of Witness (2)

Name:

Address:

.....

DECLARATION BY THE PRINCIPAL AGENT

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

Principal Agent:

Employer:		Contractor:	
Witness:		Witness:	



Date:

Employer:		Contractor:	
Witness:		Witness:	

C1.2.4 CONTRACT DATA CE (Contractor to Employer)

Contractor Addendum Code 2101-CE

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

Introduction

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

Definitions

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

Provision of Contract Data

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

Reference Clauses

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

Employer:		Contractor:	
Witness:		Witness:	



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

CONTRACT DATA – CONTRACTOR

1.0 CONTRACTING PARTY

1.1 Contractor:

[1.2]

Postal Address: _____ Code: _____

Physical Address: _____ Code: _____

E-mail: _____

Tel no.: _____ Fax no.: _____

VAT no.: _____

2.0 SECURITIES

2.1 The security provisions selected are:

2.1.1 Variable Construction Guarantee (yes/no) ☐

2.1.2 Fixed Construction Guarantee and Payment Reduction (yes/no) ☐

2.1.3 Advanced Payment is required. Where "Yes" Amount

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

Employer:		Contractor:	
Witness:		Witness:	

3.0 PAYMENT AND ADJUSTMENT OF PRELIMINARIES

3.1 Payment of preliminaries

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

3.1.1 Option A

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

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

All inclusive of **tax**

3.1.2 Option B

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

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

All inclusive of **tax**

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

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

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

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

3.2 Adjustment of preliminaries

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

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

Employer:		Contractor:	
Witness:		Witness:	

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

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

All inclusive of **tax**

3.2.1 **Option A**

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

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

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

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

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

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

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

All inclusive of **tax**

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

3.2.2 **Option B**

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

Employer:		Contractor:	
Witness:		Witness:	

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

3.2.3 **Payment certificate cash flow**

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

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

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

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

4.0 **EMPLOYER CHANGES TO JBCC STANDARD DOCUMENTS**

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

5.0 **THE TENDER**

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

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

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

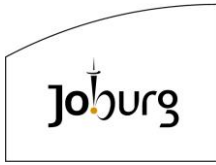
5.4 The lowest or any tender will not necessarily be accepted.

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

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

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

Employer:		Contractor:	
Witness:		Witness:	



5.8 **TENDER SUM COMPILATION** **Amount**

5.8.1 Tenderer's work including **prime cost amounts**

R

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

R

5.8.3 **SUBTOTAL**

R

5.8.4 Add **tax** on 5.8.3

R

5.8.5 **TOTAL TENDER SUM inclusive of tax**

R

5.8.6 Tender Sum in words

Thus, done and signed at _____ on _____

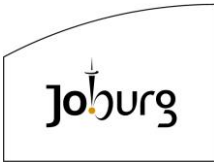
Name of Signatory

Capacity of authorised signatory

As witness

for and on behalf of the tenderer who warrants
authorisation hereto

Employer:		Contractor:	
Witness:		Witness:	



Employer:		Contractor:	
Witness:		Witness:	



CONTRACT NO. JW14452

**BUILDING UPGRADE FOR THE MEGA WAREHOUSE
IN LANGLAAGTE DEPOT**

VOLUME 1

PART 1.3: FORMS AND SECURITIES

Employer:		Contractor:	
Witness:		Witness:	

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Employer:		Contractor:	
Witness:		Witness:	

C1.3 FORMS AND SECURITIES

FORMS FOR COMPLETION BY THE CONTRACTOR

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

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

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

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

C1.3.1 Form of Guarantee

**TO BE PRINTED ON THE OFFICIAL LETTERHEAD OF THE GUARANTOR.
FORM OF DEMAND GUARANTEE IN RESPECT OF PERFORMANCE**

GUARANTEE REFERENCE NUMBER: [*]**

FORM OF ON DEMAND PERFORMANCE GUARANTEE

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

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

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

1. The *Guarantor* shall pay to the *Employer* on demand any sum or sums not exceeding the following aggregate amount: R [insert the amount] (the "*Guaranteed Amount*") on presentation of a written demand signed by the *Employer* (the "*Demand*"), supported by a written statement signed by the *Employer* certifying that the *Contractor*, in the opinion of the *Employer* as at the date of issue of such Demand, is in breach of its obligations under the Contract or that a defect had occurred following the performance by the *Contractor* of its obligations under the Contract, and without being required to prove or set out the nature of any such breach or defect.
2. Neither the failure of the *Employer* to enforce strict or substantial compliance by the *Contractor* with its

Employer:		Contractor:	
Witness:		Witness:	

obligations under the Contract nor any act, conduct or omission by the *Employer* prejudicial to the interests of the Guarantor will discharge the Guarantor from liability under this Guarantee.

3. This Guarantee:

3.1 automatically comes into full force and effect on the date of signature hereof by the Guarantor.

3.2 automatically expires, whether or not returned to the Guarantor at the earlier of:

3.2.1 [the *defects date*; or]

3.2.2 90 (ninety) calendar days after the date of termination of the Contract, as notified in writing to the Guarantor by the *Employer*; or

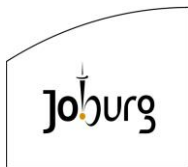
3.2.3 **[insert time]** (Central African Time), at the abovementioned address of the Guarantor on **[insert date]**,

(the “**Expiry Date**”);

3.3 constitutes the primary obligations of the Guarantor and exists independently of the Contract or any amendment, variation or novation thereof; and

3.4 is governed by the laws of the Republic of South Africa and any dispute arising hereunder shall be subject to the jurisdiction of the South African courts. In respect of such proceedings, each of the Parties specifically consents to the non-exclusive jurisdiction of the High Court of South Africa (Gauteng Local Division, Johannesburg).

Employer:		Contractor:	
Witness:		Witness:	



Section C1 Forms and Securities

4. Any Demand must be presented at the aforementioned address of the Guarantor on or before the Expiry Date. After the Expiry Date, this Guarantee shall become null and void, whether returned to the Guarantor for cancellation or not and any Demand received after the Expiry Date shall be ineffective.
5. The *Employer* may require the *Contractor* to extend this this Guarantee or replace it if the guarantee sum has not been paid in full by the date 28 days prior to the Expiry Date. If the guaranteed sum has not been paid in full by the date 28 days prior to the Expiry Date, and the guarantee has not been extended, the Guarantor unconditionally undertakes to pay to the *Employer* any amounts which the *Contractor* has not repaid (subject to the guaranteed sum) upon receipt by the *Employer*, within such 28 day period, of written demand for payment made in accordance with the terms of the advance payment guarantee.
6. Payments made in terms of this Guarantee shall be in cash, free of any set-off, with-holding, counterclaim or deduction of any nature whatsoever.
7. This Guarantee is transferable by the *Employer*, and the Guarantor consents to any transfer of this Guarantee by the *Employer* to any of its affiliates or any other person. This Guarantee is restricted to the payment of a sum of money only and limited to an aggregate amount equal to the Guaranteed Amount.
8. The Guarantor warrants that it has the power and has taken all action and obtained all licenses and approvals required for it, to grant and perform its obligations in terms of this Guarantee.
9. The Guarantor acknowledges that the *Employer* may make multiple demands under this Guarantee provided that the aggregate amount paid by the Guarantor in terms of this Guarantee shall not, at any time, exceed the Guaranteed Amount.
10. The Guarantor's obligations under this Guarantee are of a primary, independent nature and are not ancillary, accessory nor of a collateral nature, to the Contract. Any reference in this Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create a suretyship.
11. For the purposes of this Guarantee, the abovementioned address of the Guarantor shall be its *domicilium citandiet executandi* for all purposes in connection with this Guarantee.

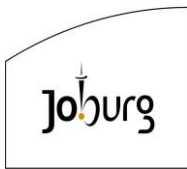
SIGNED at _____ on this _____ day of _____ 20____

Witnesses:

1. _____

For: **[insert name of the Guarantor]**
duly authorized and
warranting such authority
Full Name:

Employer:		Contractor:	
Witness:		Witness:	



Section C1 Forms and Securities

Capacity:

2.

For: **[insert name of Guarantor]**
duly authorized and
warranting such authority
Full Name:
Capacity:

C1.3.2 Blasting Indemnity

Given by _____

*Company Registration No. _____

Address _____

a *Company incorporated with limited liability according to the company laws of the Republic of South Africa,

*Partnership, *Close Corporation, *Public Company (hereinafter called the Contractor), represented herein by

_____ in his capacity as the Contractor's

_____ duly authorised hereto by a resolution of the

Contractor dated _____ a certified copy of which resolution is attached to this

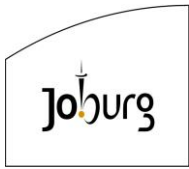
Indemnity.

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

_____ and the Company requires this Indemnity from the Contractor

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

Employer:		Contractor:	
Witness:		Witness:	



Section C1 Forms and Securities

THUS DONE AND SIGNED for and on behalf of the Contractor at

_____ on the

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

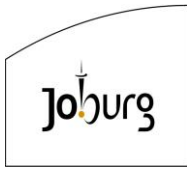
As witnesses

1. _____
Name & Surname Signature
2. _____
Name & Surname Signature

Duly authorised to
sign on behalf of _____

Address _____

Employer:		Contractor:	
Witness:		Witness:	



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

Written agreement between Johannesburg Water ((Proprietary) Limited (hereinafter referred to as "the

Employer) and _____ (hereinafter referred to as "the mandatory") as envisaged by Section 37(2) of the Occupational Health and Safety Act, No. 85, of 1993 as amended.

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

Signed this _____ day of _____ at _____

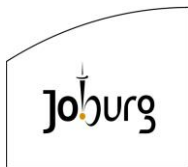
Signature on behalf of mandatory _____

Signature on behalf of Employer _____

Compensation Fund Registration No. of mandatory _____

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

Employer:		Contractor:	
Witness:		Witness:	



C1.3.4 Health and Safety Contract: General Information

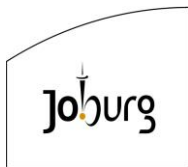
1. The Occupational Health and Safety Act comprises Sections 1 to 50 and all un-repealed regulations promulgated in terms of the former Machinery and Occupational Safety Act No 6 of 1983 as amended, as well as other regulations which may be promulgated in terms of the OHS Act.
2. 'Mandatory' is defined as including an agent, a contractor or a subcontractor for work, but without derogating from his status in his own right as an employer or user of plant and machinery
3. Section 37 of the Occupational Health and Safety Act potentially punishes employers (principals) for the unlawful acts or omissions of mandataries (contractors) save where a written agreement between the parties has been concluded containing arrangements and procedures to ensure compliance with the said Act by the mandatary.
4. All documents attached or referred to in the above agreement form an integral part of the agreement.
5. To perform in terms of this agreement mandataries must be familiar with the relevant provisions of the Act.
6. Mandataries who utilise the services of their own mandataries (subcontractors) are advised to conclude a similar written agreement.
7. Be advised that this agreement places the onus on the mandatary to contact the Employer in the event of inability to perform as per this agreement. The Employer, however, reserves the right to unilaterally take any steps as may be necessary to enforce this agreement.
8. The contractor shall be responsible for the full and proper implementation of the terms and provisions of the Act and its regulations in the area in which the work is to be undertaken by the Contractor.
9. The Contractor shall be responsible for the well-being, in relation to health and safety, of all persons coming upon or into such area in accordance with that legislation, including the implementation of any directives issued by management of the Employer in this respect.
10. The work to be done is **JW14452: BUILDING UPGRADE FOR THE MEGA WAREHOUSE IN LANGLAAGTE DEPOT**
11. The area in which the work is to be conducted is **LANGAALAGTE, JOHANNESBURG**
12. The Contractor shall familiarise himself with such area and all risks existing thereon and undertakes to report to the representative of the Employer any hazard or risk to health and safety which arises during the contract work in the area concerned and over which the Contractor may have no control. All necessary and appropriate safety / health equipment shall be issued by the Contractor to all persons working on or coming into the area.

C1.3.4.1 Occupational Health and Safety Indemnity Undertaking

I, the undersigned _____

in my capacity as _____

Employer:		Contractor:	
Witness:		Witness:	



Section C1 Forms and Securities

of the firm _____

1. Hereby undertake to ensure that I/my firm and/or employees and/or subcontractors and/or his employees -
 - 1.1 comply strictly with the provisions of the Occupational Health and Safety Act of 1993 (as amended) and/or the regulations promulgated in terms thereof, with specific reference to section 37(2) of the said act, as well as any relevant legislation, in the course of the performance/execution of any service and/or work in, to or on any of the Employer's buildings, construction sites and/or premises;
 - 1.2 ensure that consultants and/or visitors comply with any instructions and measures relating to occupational health and safety, as prescribed by the Employer; and
 - 1.3 comply strictly with the statutorily prescribed work systems, operational equipment, machinery and occupational health and safety conditions;
2. And as an independent employer and contractor, hereby indemnify, in terms of the above undertakings, the Employer -
 - 2.1 in respect of any costs that I/my firm and/or employees and/or subcontractors and their employees may incur of necessity in compliance with the above undertakings; and
 - 2.2 against any claims that may be instituted against the Employer and/or any liability that the Employer may incur, whether instituted and/or caused by me/my firm's employees, agents, consultants, subcontractors and/or their employees and visitors or the Employer's clients or neighbours in respect of any incidents related to my/my firm's activities and as a result of which the occupational health and safety of the persons involved have been detrimentally affected; and
 - 2.3 against similar claims that I, managers or directors of my firm may have against the Employer and any damages for which I, managers or directors of my firm hold the Employer liable.
3. My firm's compensation commissioner number is _____
and I confirm that my firm and its subcontractors' fees have been paid up and obligations in respect of the compensation commissioner have been complied with and further that I shall furnish proof thereof in writing on request.
4. I hereby confirm that I have the authority to sign this indemnity undertaking and that the Employer is not obliged to confirm such confirmation.

Signed at _____ This _____ day of _____

Signature _____ Capacity _____

As witnesses:

1 _____
2 _____

Employer:		Contractor:	
Witness:		Witness:	

Johannesburg Water SOC Ltd



VOLUME 1

PART C2: PRICING DATA

Employer:		Contractor:	
Witness:		Witness:	



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Employer:		Contractor:	
Witness:		Witness:	

C2 PRICING DATA

C2.1 PRICING INSTRUCTIONS

2.1.1 STANDARD SYSTEM OF MEASURING WORK

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

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

2.1.2 JBCC SERIES 2000 PRINCIPAL BUILDING AGREEMENT

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

2.1.3 PRELIMINARY AND GENERAL REQUIREMENTS

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

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

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

2.1.5 PRICES AND RATES

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

Employer:		Contractor:	
Witness:		Witness:	

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

2.1.6 DRAWINGS

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

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

2.1.7 TYPE AND MANUFACTURED SPECIFIED PRICES

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

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

Substitution will be strictly subject to the Principal Agent approval.

2.1.8 RATES CONTAINED IN BILLS OF QUANTITIES

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

2.1.9 RATES FOR WORK OF SIMILAR DESCRIPTION

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

2.1.10 NON-COMPLETION OF PRICES

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

2.1.11 NON-RELEVANT ITEMS

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

2.1.12 CONTRACT DATA

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

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

Employer:		Contractor:	
Witness:		Witness:	

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

2.1.13 ORDERING OF MATERIALS

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

2.1.14 AMOUNT OF PRELIMINARIES AND GENERAL

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

2.1.15 EXTENSION OF THE INITIAL CONTRACT PERIOD

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

2.1.16 ADJUSTMENTS OF THE PRELIMINARIES AND GENERAL

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

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

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

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

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

2.1.17 LABOUR-INTENSIVE METHODS

Employer:		Contractor:	
Witness:		Witness:	

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

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

2.1.18 MODEL PREAMBLES FOR TRADES

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

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

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

2.1.19 MODEL BUILDING SPECIFICATIONS AND STANDARDS GUIDE

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

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

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

2.1.20 ALTERATIONS, ERASURE, OMISSIONS OR ADDITIONS TO BOQ

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

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

The Bill of Quantities shall be completed by hand in INK or TYPED. Tenderers are permitted to complete and submit the electronic Bill of Quantities (BOQ) instead of filling out the BOQ in the tender document. The original pages of the tender document should not be removed. The electronic version may be submitted as an annexure or inserted as additional pages within the tender document. Tenderers are not permitted to alter the document by amending the descriptions and/or quantities specified in the BOQ.

2.1.21

PRIME COST AMOUNTS AND PROVISIONAL SUMS

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

2.1.22

SABS SPECIFICATIONS

Employer:		Contractor:	
Witness:		Witness:	

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

2.1.23 VALUE ADDED TAX

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

2.1.24 PRICED BILLS OF QUANTITIES

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

2.1.25 TRAINING OF LABOUR

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

2.1.26 UNITS OF MEASUREMENT

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

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

2.1.27 PROVIDED PREVIOUSLY

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

However, where applicable the Contractor shall:

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

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

2.1.28 PERMITS AND WAY-LEAVES

Employer:		Contractor:	
Witness:		Witness:	

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

2.1.29 CONFINED SPACE

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

2.1.30 FAILURE TO SUBMIT REPORTS AND ASSOCIATED VISUAL MEDIA

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

2.1.31 SECURITY

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

2.1.32 PAYMENT ONLY FOR WORKS COMPLETED

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

2.1.33 CONCRETE

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

2.1.34 FORMWORK

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

Employer:		Contractor:	
Witness:		Witness:	

propping, maintaining, keeping damp whilst the concrete is being deposited and removing of formwork.

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

2.1.35 PLASTERING AND IN-SITU FINISHES

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

2.1.36 HEALTH AND SAFETY

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

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

2.1.37 COMPILE HEALTH AND SAFETY PLAN

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

2.1.38 IMPLEMENTATION OF HEALTH AND SAFETY PLAN

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

2.1.39 EMP IMPLEMENTATION AND MAINTENANCE

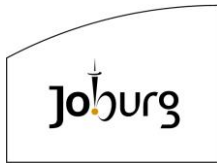
The rate shall include the complete cost for the provision of resources (human and equipment), communication, transportation and travelling, documentation of activities and reporting activities required to fully comply with the implementation and maintenance of the EMP contained in Volume 2 for the duration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

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

2.1.40 SUB-CONTRACTED WORK

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

Employer:		Contractor:	
Witness:		Witness:	



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

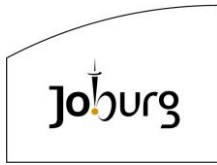
However if the Contractor deems the allocated rates to be insufficient the contractor may submit an alternative offer – however this offer will be considered as the contractors offer and will be utilised during evaluation.

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

- The Contractor shall ensure that the Subcontractor(s) complies with the paying all amounts due in respect of his employees and himself in terms of all relevant legislation and regulations including, but not confined to, the
 - Income Tax Act, the
 - Compensation for Occupational Injuries and Diseases Act,
 - Unemployment Insurance Act,
 - Basic Conditions of Employment Act
- Monitoring of the Quality of Work completed by the Sub-contractor/SMME
- Skills transfer during the execution of the project
- Compliance with all aspects of the Scope of Work
- Assistance with sourcing of applicable material in line with the technical data sheets

Further an allowance has been made for “Training” – this is related to CETA accredited training which is to be agreed with the Employer during project execution. No amount can be claimed under this item for on-site or on-the-job training, only for accredited training which the SMME receives.

Employer:		Contractor:	
Witness:		Witness:	



C2.2 BILL OF QUANTITIES

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

Employer:		Contractor:	
Witness:		Witness:	

ITEM NO	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 1 PRELIMINARIES AND GENERAL PRELIMINARIES NOTES Any reference to the words "Tender" or "Tenderer" herein and/or in any other documentation shall be construed to have the same meaning as the words "Bid" or "Bidder" PRELIMINARIES The JBCC Preliminaries Code 2103, May 2005 edition for use with the JBCC Principal Building Agreement Edition 4.1 Code 2101, March 2005 is taken to be incorporated herein. The tenderer is deemed to have referred to these documents for the full intent and meaning of each clause. These clauses are referred to by number and heading only. Where standard clauses or options are not applicable to the contract such modifications or corrections as are necessary are given under each relevant clause. Where an item is not relevant to this specific contract such item is marked "N/A" signifying "Not Applicable" PRICING OF PRELIMINARIES Should Option A, as set out in clause B10.3.1 hereinafter be used for the adjustment of preliminaries then each item priced is to be allocated to one or more of the three categories Fixed, Value Related or Time Related and the respective amounts entered in the spaces provided under each item Items not priced in these Preliminaries shall be deemed to be included elsewhere in these Bills of Quantities SECTION A: JBCC PRINCIPAL BUILDING AGREEMENT DEFINITIONS A A1.0 DEFINITIONS AND INTERPRETATION Clause 1.0 Clause 1.1 Definition of "Commencement Date" is added: "COMMENCEMENT DATE" means the date that the agreement, made in terms of the Form of Offer and Acceptance, comes into effect Clause 1.1 Definition of "Construction Guarantee" is amended by replacing it with the following: "CONSTRUCTION GUARANTEE" means a guarantee at call obtained by the contractor from an institution approved by the employer in terms of the employer's construction guarantee form as selected in the schedule Clause 1.1 Definition of "Construction Period" is amended by replacing it with the following: "CONSTRUCTION PERIOD" means the period commencing on the commencement date and ending on the date of practical completion				
	Total Carried Forward				R -

Total Brought Forward 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. 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 1.6 is amended by replacing the words "prepaid registered post, telefax or e-mail" with "prepaid registered post or telefax" Clause 1.6.4 is amended by replacing it with the following: No clause Fixed:..... Value related:..... Time related:.....	R -
Total Carried Forward	R -

Total Brought Forward			R	-
<u>OBJECTIVE AND PREPARATION</u>				
A	A2.0 OFFER, ACCEPTANCE AND PERFORMANCE Clause 2.0 Fixed:..... Value related:..... Time related:.....	Item	R	-
B	A3.0 DOCUMENTS Clause 3.0 Clause 3.2.1 is amended by replacing "14.1" with "14.0" Clause 3.7 is amended by the addition of the following: The contractor shall supply and keep a copy of the JBCC Series 2000 Principal Building Agreement and Preliminaries applicable to this contract on the site, to which the employer, principal agent and agents shall have access at all times Clause 3.10 is amended by replacing the second reference to "principal agent" with the word "employer" Fixed:..... Value related:..... Time related:.....	Item	R	-
A	A4.0 DESIGN RESPONSIBILITY Clause 4.0 Clause 4.3 is amended by replacing it with the following: No clause Fixed:..... Value related:..... Time related:.....	Item	R	-
B	A5.0 EMPLOYER'S AGENTS Clause 5.0 Clause 5.1.2 is amended to include clauses 32.6.3, 34.3, 34.4 and 38.5.8 Fixed:..... Value related:..... Time related:.....	Item	R	-
C	A6.0 SITE REPRESENTATIVE Clause 6.0 Fixed:..... Value related:..... Time related:.....	Item	R	-
D	A7.0 COMPLIANCE WITH REGULATIONS Clause 7.0 Note: A separate clause has been included in Section C : Specific Preliminaries of the bills of quantities / lump sum document for the contractor to have the opportunity to price for all the requirements of the Occupational Health and Safety Act, Construction Regulations and Health and Safety Specification Fixed:..... Value related:..... Time related:.....	Item	R	-
E	A8.0 WORKS RISK Clause 8.0 Fixed:..... Value related:..... Time related:.....	Item	R	-
F	A9.0 INDEMNITIES Clause 9.0 Fixed:..... Value related:..... Time related:.....	Item	R	-
G	A10.0 WORKS INSURANCES Clause 10.0 Clause 10.0 is amended by the addition of the following clauses: 10.5 Damage to the Works (a) Without in any way limiting the contractor's obligations in terms of the contract, the contractor shall bear the full risk of damage to and/or destruction of the works by whatever cause during construction of the works and hereby indemnifies and holds harmless the employer against any such damage. The contractor shall take such precautions and security measures and other steps for the protection and security of the works as the contractor may deem necessary			
Total Carried Forward			R	-

Total Brought Forward (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 10.6 Injury to Persons or loss of or damage to Properties (a) The contractor shall be liable for and hereby indemnifies the employer against any liability, loss, claim or proceeding whether arising in common law or by statute, consequent upon personal injuries to or the death of any person whomsoever arising out of or in the course of or caused by the execution of the works unless due to any act or negligence of any person for whose actions the employer is legally liable (b) The 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	R -
Total Carried Forward	R -

Total Brought Forward (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 10.7 High risk insurance In the event of the project being executed in a geological area classified as a "High Risk Area", that is an area which is subject to highly unstable subsurface conditions that might result in catastrophic ground movement evident by sinkhole or doline formation the following will apply: 10.7.1 Damage to the works The contractor shall, from the commencement date of the works until the date of the certificate of practical completion bear the full risk of and hereby indemnifies and holds harmless the employer against any damage to and/or destruction of the works consequent upon a catastrophic ground movement as mentioned above. The contractor shall take such precautions and security measures and other steps for the protection of the works as he may deem necessary When so instructed to do so by the principal agent, the contractor shall proceed immediately to remove and/or dispose of any debris arising from damage to or destruction of the works and to rebuild, restore, replace and/or repair the works, at the contractor's own costs 10.7.2 Injury to persons or loss of or damage to property The contractor shall be liable for and hereby indemnifies and holds harmless the employer against any liability, loss, claim or proceeding arising at any time during the period of the contract whether arising in common law or by statute, consequent upon personal injuries to or the death of any person whomsoever resulting from, arising out of, or caused by a catastrophic ground movement as mentioned above The contractor shall be liable for and hereby indemnifies the 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 10.7.3 It is the responsibility of the contractor to ensure that he has adequate insurance to cover his risk and liability as mentioned in 10.7.1 and 10.7.2. Without limiting the contractor's obligations in terms of the contract, the contractor shall, within twenty one (21) calendar days of the commencement date but before commencement of the works, submit to the employer proof of such insurance policy, if requested to do so	R -
Total Carried Forward	R -

Total Brought Forward						R	-	
10.7.4 The employer shall be entitled to recover any and all losses and/or damages of whatever nature suffered or incurred consequent upon the contractor's default of his obligations as set out in 10.7.1; 10.7.2 and 10.7.3. Such losses or damages may be recovered from the contractor or by deducting the same from any amounts still due under this contract or under any other contract presently or hereafter existing between the employer and the contractor and for this purpose all these contracts shall be considered one indivisible whole Fixed:..... Value related:..... Time related:.....						Item	R	-
A	A11.0	LIABILITY INSURANCES	Clause 11.0	Fixed:..... Value related:.....	Time related:.....	Item	R	-
B	A12.0	EFFECTING INSURANCES	Clause 12.0	Fixed:..... Value related:.....	Time related:.....	Item	R	-
C	A13.0	No clause				N/A		
D	A14.0	SECURITY	Clause 14.0	Clauses 14.1 - 14.8 are amended by replacing them with the following: 14.1 In respect of contracts with a contract sum up to R1 million, the security to be provided by the contractor to the employer will be a payment reduction of five per cent (5%) of the value certified in the payment certificate (excluding VAT) 14.1.1 The payment reduction of the value certified in a payment certificate shall be mutatis mutandi in terms of 31.8(A) 14.1.2 The employer shall be entitled to recover expense and loss from the payment reduction in terms of 33.0 provided that the employer complies with the provisions of 33.4 in which event the employer's entitlement shall take precedence over his obligations to refund the payment reduction security or portions thereof to the contractor 14.2 In respect of contracts with a contract sum above R1 million, the contractor shall have the right to select the security to be provided in terms of 14.3, 14.4, 14.5, 14.6, or 14.7 as stated in the schedule. Such security shall be provided to the employer within twenty one (21) calendar days from commencement date. Should the contractor fail to select the security to be provided or should the contractor fail to provide the employer with the selected security within twenty one (21) calendar days from commencement date, the security in terms of 14.7 shall be deemed to have been selected 14.3 Where security as a cash deposit of ten per cent (10%) of the contract sum (excluding VAT) has been selected:				
Total Carried Forward						R	-	

Total Brought Forward 14.3.1 The contractor shall furnish the employer with a cash deposit equal in value to ten per cent (10%) of the contract sum (excluding VAT) within twenty one (21) calendar days from commencement date 14.3.2 Within twenty one (21) calendar days of the date of practical completion of the works the employer shall reduce the cash deposit to an amount equal to three per cent (3%) of the contract value (excluding VAT), and refund the balance to the contractor 14.3.3 Within twenty one (21) calendar days of the date of final completion of the works the employer shall reduce the cash deposit to an amount equal to one per cent (1%) of the contract value (excluding VAT) and refund the balance to the contractor 14.3.4 On the date of payment of the amount in the final payment certificate, the employer shall refund the remainder of the cash deposit to the contractor 14.3.5 The employer shall be entitled to recover expense and loss from the cash deposit in terms of 33.0 provided that the employer complies with the provisions of 33.4 in which event the employer's entitlement shall take precedence over his obligations to refund the cash deposit security or portions thereof to the contractor 14.3.6 The parties expressly agree that neither the employer nor the contractor shall be entitled to cede the rights to the deposit to any third party 14.4 Where security as a variable construction guarantee of ten percent (10%) of the contract sum (excluding VAT) has been selected: 14.4.1 The contractor shall furnish the employer with an acceptable variable construction guarantee equal in value to ten per cent (10%) of the contract sum (excluding VAT) within twenty one (21) calendar days from commencement date 14.4.2 The variable construction guarantee shall reduce and expire in terms of the Variable Construction Guarantee form included in the invitation to tender 14.4.3 The employer shall return the variable construction guarantee to the contractor within fourteen (14) calendar days of it expiring 14.4.4 Where the employer has a right of recovery against the contractor in terms of 33.0, the employer shall issue a written demand in terms of the variable construction guarantee 14.5 Where security as a fixed construction guarantee of five per cent (5%) of the contract sum (excluding VAT) and a five per cent (5%) payment reduction of the value certified in the payment certificate (excluding VAT) has been selected:	R -
Total Carried Forward	R -

Total Brought Forward 14.5.1 The contractor shall furnish a fixed construction guarantee to the employer equal in value to five per cent (5%) of the contract sum (excluding VAT) 14.5.2 The fixed construction guarantee shall come into force on the date of issue and shall expire on the date of the last certificate of practical completion 14.5.3 The employer shall return the fixed construction guarantee to the contractor within fourteen (14) calendar days of it expiring 14.5.4 The payment reduction of the value certified in a payment certificate shall be in terms of 31.8 (A) and 34.8 14.5.5 Where the employer has a right of recovery against the contractor in terms of 33.0, the employer shall be entitled to issue a written demand in terms of the fixed construction guarantee or may recover from the payment reduction or may do both 14.6 Where security as a cash deposit of five per cent (5%) of the contract sum (excluding VAT) and a payment reduction of five per cent (5%) of the value certified in the payment certificate (excluding VAT) has been selected: 14.6.1 The contractor shall furnish the employer with a cash deposit equal in value to five per cent (5%) of the contract sum (excluding VAT) within twenty one (21) calendar days from commencement date 14.6.2 Within twenty one (21) calendar days of the date of practical completion of the works the employer shall refund the cash deposit in total to the contractor 14.6.3 The payment reduction of the value certified in a payment certificate shall be mutatis mutandi in terms of 31.8(A) 14.6.4 Where the employer has a right of recovery against the contractor in terms of 33.0, the employer may issue a written notice in terms of 33.4 or may recover from the payment reduction or may do both 14.7 Where security as a payment reduction of ten per cent (10%) of the value certified in the payment certificate (excluding VAT) has been selected: 14.7.1 The payment reduction of the value certified in a payment certificate shall be mutatis mutandi in terms of 31.8(B) 14.7.2 The employer shall be entitled to recover expense and loss from the payment reduction in terms of 33.0 provided that the employer complies with the provisions of 33.4 in which event the employer's entitlement shall take precedence over his obligations to refund the payment reduction or portions thereof to the contractor	R -
Total Carried Forward	R -

Total Brought Forward			R	-			
14.8 Payments made by the guarantor to the employer in terms of the fixed or variable construction guarantee shall not prejudice the rights of the employer or contractor in terms of this agreement 14.9 Should the contractor fail to furnish the security in terms of 14.2, the employer, in his sole discretion and without notification to the contractor, is entitled to change the contractor's selected form of security to that of a ten per cent (10%) payment reduction of the value certified in the payment certificate (excluding VAT), whereafter 14.7 shall be applicable Fixed:..... Value related:..... Time related:.....					Item	R	-
EXECUTION							
A	A15.0 PREPARATION FOR AND EXECUTION OF THE WORKS Clause 15.0 Clause 15.1.1 is amended by replacing it with: No clause Clause 15.1.2 is amended by replacing it with: The security selected in terms of 14.0						
Clause 15.1 is amended by the addition of the following clause: 15.1.4 An acceptable health and safety plan, required in terms of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), within twenty one (21) calendar days of commencement date							
Clause 15.2.1 is amended by replacing it with the following clause:							
Give the contractor possession of the site within ten (10) working days of the contractor complying with the terms of 15.1.4 Fixed:..... Value related:..... Time related:.....					Item	R	-
B	A16.0 ACCESS TO THE WORKS Clause 16.0 Fixed:..... Value related:..... Time related:.....				Item	R	-
C	A17.0 CONTRACT INSTRUCTIONS Clause 17.0 Clause 17.1.11 is amended by deleting the words "and the appointment of nominated and selected subcontractors" Fixed:..... Value related:..... Time related:.....				Item	R	-
D	A18.0 SETTING OUT OF THE WORKS Clause 18.0 Fixed:..... Value related:..... Time related:.....				Item	R	-
E	A19.0 ASSIGNMENT Clause 19.0 Fixed:..... Value related:..... Time related:.....				Item	R	-
A	A20.0 NOMINATED SUBCONTRACTORS Clause 20.0 Clause 20.1.3 is amended by replacing it with the following: No clause Note: See item B9.1 hereinafter for adjustment of attendance on nominated subcontractors executing work allowed for under provisional sums Fixed:..... Value related:..... Time related:.....				Item	R	-
Total Carried Forward				R	-		

Total Brought Forward			R	-
B	A21.0 SELECTED SUBCONTRACTORS Clause 21.0 Clause 21 is amended by replacing it with: No clause Fixed:..... Value related:..... Time related:.....	Item	R	-
C	A22.0 EMPLOYER'S DIRECT CONTRACTORS Clause 22.0 Fixed:..... Value related:..... Time related:.....	Item	R	-
D	A23.0 CONTRACTOR'S DOMESTIC SUBCONTRACTORS Clause 23.0 Fixed:..... Value related:..... Time related:.....	Item	R	-
COMPLETION				
E	A24.0 PRACTICAL COMPLETION Clause 24.0 Fixed:..... Value related:..... Time related:.....	Item	R	-
F	A25.0 WORKS COMPLETION Clause 25.0 Fixed:..... Value related:..... Time related:.....	Item	R	-
A	A26.0 FINAL COMPLETION Clause 26.0 Clause 26.1.2 is amended by inserting "#" next to 26.1.2 Fixed:..... Value related:..... Time related:.....	Item	R	-
B	A27.0 LATENT DEFECTS LIABILITY PERIOD Clause 27.0 Fixed:..... Value related:..... Time related:.....	Item	R	-
C	A28.0 SECTIONAL COMPLETION Clause 28.0 Fixed:..... Value related:..... Time related:.....	Item	R	-
D	A29.0 REVISION OF DATE FOR PRACTICAL COMPLETION Clause 29.0 Clause 29.2.5 is amended by replacing it with: No clause Fixed:..... Value related:..... Time related:.....	Item	R	-
E	A30.0 PENALTY FOR NON-COMPLETION Clause 30.0 Fixed:..... Value related:..... Time related:.....	Item	R	-
PAYMENT				
F	A31.0 INTERIM PAYMENT TO THE CONTRACTOR Clause 31.0 Clause 31.5.2 is amended by replacing "14.7.1" with "14.0" Clause 31.8 is amended by replacing it with the following two alternative clauses: Alternative A 31.8(A) Where a security is selected in terms of 14.1; 14.5 or 14.6, the value of the works in terms of 31.4.1 and materials and goods in terms of 31.4.2 shall be certified in full. The value certified shall be subject to the following percentage adjustments:			
Total Carried Forward			R	-

Total Brought Forward			R	-
31.8(A).1 Ninety five per cent (95%) of such value in interim payment certificates issued up to the date of practical completion				
31.8(A).2 Ninety seven per cent (97%) of such value in interim payment certificates issued on the date of practical completion and up to but excluding the date of final completion				
31.8(A).3 Ninety nine per cent (99%) of such value in interim payment certificates issued on the date of final completion and up to but excluding the final payment certificate in terms of 34.6				
31.8(A).4 One hundred per cent (100%) of such value in the final payment certificate in terms of 34.6 except where the amount certified is in favour of the employer. In such an event the payment reduction shall remain at the adjustment level applicable to the final payment certificate				
Alternative B				
31.8(B) Where security as a payment reduction in terms of 14.7 has been selected, the value of the works in terms of 31.4.1 and materials and goods in terms of 31.4.2 shall be certified in full. The value certified shall be subject to the following percentage adjustments:				
31.8(B).1 Ninety per cent (90%) of such value in interim payment certificates issued up to the date of practical completion				
31.8(B).2 Ninety seven per cent (97%) of such value in interim payment certificates issued on the date of practical completion and up to but excluding the date of final completion				
31.8(B).3 Ninety nine per cent (99%) of such value in interim payment certificates issued on the date of final completion and up to but excluding the final payment certificate in terms of 34.6				
31.8(B).4 One hundred per cent (100%) of such value in the final payment certificate in terms of 34.6 except where the amount certified is in favour of the employer. In such an event the payment reduction shall remain at the adjustment level applicable to the final payment certificate				
Clause 31.12 is amended by deleting the following:				
Payment shall be subject to the employer giving the contractor a tax invoice for the amount due Fixed:..... Value related:..... Time related:.....				
	Item		R	-
A	A32.0 ADJUSTMENT TO THE CONTRACT VALUE Clause 32.0 Clauses 32.5.1, 32.5.4 and 32.5.7 are amended by the addition of the following at the end of the sentence: "due to no fault of the contractor" Fixed:..... Value related:..... Time related:.....			
	Item		R	-
Total Carried Forward			R	-

Total Brought Forward			R	-
B	A33.0 RECOVERY OF EXPENSE AND LOSS Clause 33.0 Fixed:..... Value related:..... Time related:.....	Item	R	-
C	A34.0 FINAL ACCOUNT AND FINAL PAYMENT Clause 34.0 Clause 34.1 is amended by removing "#" next to 34.1 Clause 34.2 is amended by inserting "#" next to 34.2 Clause 34.8 is amended by deleting the words "where security as a fixed construction guarantee in terms of 14.4 has been selected or where payment reduction has been applied in terms of 14.7.1" Clause 34.13 is amended by replacing "seven (7) calendar days" with "twenty one (21) calendar days" and deleting the words "subject to the employer giving the contractor a tax invoice for the amount due" Fixed:..... Value related:..... Time related:.....	Item	R	-
D	A35.0 PAYMENT TO OTHER PARTIES Clause 35.0 Fixed:..... Value related:..... Time related:.....	Item	R	-
<u>CANCELLATION</u>				
A	A36.0 CANCELLATION BY EMPLOYER - CONTRACTOR'S DEFAULT Clause 36.0 Clause 36.1 is amended by the addition of the following clauses: 36.1.3 refuses or neglects to comply strictly with any of the conditions of contract 36.1.4 estate being sequestrated, liquidated or surrendered in terms of the insolvency laws in force within the Republic of South Africa 36.1.5 in the judgement of the employer, has engaged in corrupt or fraudulent practices in competing for or in executing the contract Clause 36.3 is amended by removing the reference to "No clause" and replacing the words "principal agent" with "employer"			
	Clause 36.0 is amended by the addition of the following clause:			
	36.7 Notwithstanding any clause to the contrary, on cancellation of this agreement either by the employer or the contractor; or for any reason whatsoever, the contractor shall on written instruction, discontinue with the works on a date stated and withdraw himself from the site. The contractor shall not be entitled to refuse to withdraw from the works on the grounds of any lien or right of retention or on the grounds of any other right whatsoever Fixed:..... Value related:..... Time related:.....	Item	R	-
B	A37.0 CANCELLATION BY EMPLOYER - LOSS AND DAMAGE Clause 37.0 Clause 37.3.5 is amended by replacing "ninety (90)" with "one hundred and twenty (120)"			
	Clause 37.0 is amended by the addition of the following clause: 37.5 Notwithstanding any clause to the contrary, on cancellation of this agreement either by the employer or the contractor; or for any reason whatsoever, the contractor shall on written instruction, discontinue with the works on a date stated and withdraw himself from the site. The contractor shall not be entitled to refuse to withdraw from the works on the grounds of any lien or right of retention or on the grounds of any other right whatsoever Fixed:..... Value related:..... Time related:.....	Item	R	-
Total Carried Forward			R	-

Total Brought Forward						R	-	
C	A38.0 CANCELLATION BY CONTRACTOR - EMPLOYER'S DEFAULT Clause 38.0 Clause 38.5.4 is amended by replacing "ninety (90)" with "one hundred and twenty (120)" Clause 38.0 is amended by the addition of the following clause:							
	38.7 Notwithstanding any clause to the contrary, on cancellation of this agreement either by the employer or the contractor; or for any reason whatsoever, the contractor shall on written instruction, discontinue with the works on a date stated and withdraw himself from the site. The contractor shall not be entitled to refuse to withdraw from the works on the grounds of any lien or right of retention or on the grounds of any other right whatsoever Fixed:..... Value related:..... Time related:.....						Item	R -
A	A39.0 CANCELLATION - CESSATION OF THE WORKS Clause 39.0 Clause 39.3.5 is amended by the addition of the following at the end of the sentence: "within one hundred and twenty (120) working days of completion of such a report" Fixed:..... Value related:..... Time related:.....						Item	R -
	DISPUTE							
B	A40.0 DISPUTE SETTLEMENT Clause 40.0 Clause 40.2.2 is amended by replacing "one (1) year" with "three (3) years" Clause 40.6 is amended by removing the reference to: No clause Clause 40.7.1 is amended by replacing "(10)" with "(15)" and by the addition of the following: Whether or not mediation resolves the dispute, the parties shall bear their own costs concerning the mediation and equally share the costs of the mediator and related costs Fixed:..... Value related:..... Time related:.....						Item	R -
	SUBSTITUTE PROVISIONS							
C	A41.0 STATE CLAUSES Clause 41.0 Fixed:..... Value related:..... Time related:.....						Item	R -
	CONTRACT VARIABLES							
A	A42.0 THE SCHEDULE (DPW-04EC) Clause 42.0 Tenderers are referred to the Contract Data DPW-04(EC) for variables pertaining to this contract Fixed:..... Value related:..... Time related:.....						Item	R -
	SECTION B: JBCC PRELIMINARIES							
	B1.0DEFINITIONS AND INTERPRETATION							
A	B1.1 Definitions and interpretation See also clause A1.0 of Section A for additional and/or amended definitions which shall apply equally to this Section Fixed:..... Value related:..... Time related:.....						Item	R -
	B2.0DOCUMENTS							
B	B2.1 Checking of documents Fixed:..... Value related:..... Time related:.....						Item	R -
C	B2.2 Provisional bills of quantities Fixed:..... Value related:..... Time related:.....						Item	R -
Total Carried Forward						R	-	

			Total Brought Forward	R	-
D	B2.3 Availability of construction documentation Fixed:..... Value related:..... Time related:.....	Item		R	-
E	B2.4 Interests of agents Fixed:..... Value related:..... Time related:.....	Item		R	-
F	B2.5 Priced documents Fixed:..... Value related:..... Time related:.....	Item		R	-
G	B2.6 Tender submission Clause 2.6 is amended by replacing "JBCC Form of Tender" with "Form of Offer and Acceptance DPW-07(EC)" Fixed:..... Value related:..... Time related:.....	Item		R	-
	<u>B3.0THE SITE</u>				
H	B3.1 Defined works area Fixed:..... Value related:..... Time related:.....	Item		R	-
I	B3.2 Geotechnical investigation Fixed:..... Value related:..... Time related:.....	Item		R	-
A	B3.3 Inspection of the site Fixed:..... Value related:..... Time related:.....	Item		R	-
B	B3.4 Existing premises occupied Fixed:..... Value related:..... Time related:.....	Item		R	-
C	B3.5 Previous work - dimensional accuracy Fixed:..... Value related:..... Time related:.....	Item		R	-
D	B3.6 Previous work - defects Fixed:..... Value related:..... Time related:.....	Item		R	-
E	B3.7 Services - known Fixed:..... Value related:..... Time related:.....	Item		R	-
F	B3.8 Services - unknown Fixed:..... Value related:..... Time related:.....	Item		R	-
G	B3.9 Protection of trees Fixed:..... Value related:..... Time related:.....	Item		R	-
H	B3.10 Articles of value Fixed:..... Value related:..... Time related:.....	Item		R	-
I	B3.11 Inspection of adjoining properties Fixed:..... Value related:..... Time related:.....	Item		R	-
	<u>B4.0MANAGEMENT OF CONTRACT</u>				
J	B4.1 Management of the works Fixed:..... Value related:..... Time related:.....	Item		R	-
K	B4.2 Programme for the works Fixed:..... Value related:..... Time related:.....	Item		R	-
L	B4.3 Progress meetings Fixed:..... Value related:..... Time related:.....	Item		R	-
	Total Carried Forward			R	-

Total Brought Forward				R	-
A	B4.4 Technical meetings	Fixed:..... Value related:..... Time related:.....	Item	R	-
B	B4.5 Labour and plant records	Fixed:..... Value related:..... Time related:.....	Item	R	-
<u>B5.0SAMPLES, SHOP DRAWINGS AND MANUFACTURERS' INSTRUCTIONS</u>					
C	B5.1 Samples of materials	Fixed:..... Value related:..... Time related:.....	Item	R	-
D	B5.2 Workmanship samples	Fixed:..... Value related:..... Time related:.....	Item	R	-
E	B5.3 Shop drawings	Fixed:..... Value related:..... Time related:.....	Item	R	-
F	B5.4 Compliance with manufacturers' instructions	Fixed:..... Value related:..... Time related:.....	Item	R	-
<u>B6.0TEMPORARY WORKS AND PLANT</u>					
G	B6.1 Deposits and fees	Fixed:..... Value related:..... Time related:.....	Item	R	-
H	B6.2 Enclosure of the works	Fixed:..... Value related:..... Time related:.....	Item	R	-
I	B6.3 Advertising	Fixed:..... Value related:..... Time related:.....	Item	R	-
J	B6.4 Plant, equipment, sheds and offices	Fixed:..... Value related:..... Time related:.....	Item	R	-
K	B6.5 Main notice board	Fixed:..... Value related:..... Time related:.....	Item	R	-
L	B6.6 Subcontractors' notice board	Fixed:..... Value related:..... Time related:.....	Item	R	-
<u>B7.0TEMPORARY SERVICES</u>					
A	B7.1 Location	Fixed:..... Value related:..... Time related:.....	Item	R	-
B	B7.2 Water	Fixed:..... Value related:..... Time related:.....	Item	R	-
C	B7.3 Electricity	Fixed:..... Value related:..... Time related:.....	Item	R	-
D	B7.4 Telecommunication facilities	Fixed:..... Value related:..... Time related:.....	Item	R	-
E	B7.5 Ablution facilities	Fixed:..... Value related:..... Time related:.....	Item	R	-
<u>B8.0PRIME COST AMOUNTS</u>					
F	B8.1 Responsibility for prime cost amounts	Fixed:..... Value related:..... Time related:.....	Item	R	-
Total Carried Forward				R	-

Total Brought Forward				R	-
<u>B9.0 ATTENDANCE ON N/S SUBCONTRACTORS</u>					
G	B9.1 General attendance	Fixed:..... Value related:..... Time related:.....	Item	R	-
H	B9.2 Special attendance	Fixed:..... Value related:..... Time related:.....	Item	R	-
I	B9.3 Commissioning - fuel, water and electricity	Fixed:..... Value related:..... Time related:.....	Item	R	-
<u>B10.0 FINANCIAL ASPECTS</u>					
J	B10.1 Statutory taxes, duties and levies	Fixed:..... Value related:..... Time related:.....	Item	R	-
K	B10.2 Payment for preliminaries	Fixed:..... Value related:..... Time related:.....	Item	R	-
A	B10.3 Adjustment of preliminaries	Clauses B10.3.1 and B10.3.2 are amended by replacing "within fifteen (15) working days of taking possession of the site" with "when submitting his priced bills of quantities / lump sum document" Fixed:..... Value related:..... Time related:.....	Item	R	-
B	B10.4 Payment certificate cash flow	Fixed:..... Value related:..... Time related:.....	Item	R	-
<u>B11.0 GENERAL</u>					
C	B11.1 Protection of the works	Fixed:..... Value related:..... Time related:.....	Item	R	-
D	B11.2 Protection / isolation of existing / sectionally occupied works	Fixed:..... Value related:..... Time related:.....	Item	R	-
E	B11.3 Security of the works	Fixed:..... Value related:..... Time related:.....	Item	R	-
F	B11.4 Notice before covering work	Fixed:..... Value related:..... Time related:.....	Item	R	-
G	B11.5 Disturbance	Fixed:..... Value related:..... Time related:.....	Item	R	-
H	B11.6 Environmental disturbance	Fixed:..... Value related:..... Time related:.....	Item	R	-
I	B11.7 Works cleaning and clearing	Fixed:..... Value related:..... Time related:.....	Item	R	-
J	B11.8 Vermin	Fixed:..... Value related:..... Time related:.....	Item	R	-
K	B11.9 Overhand work	Fixed:..... Value related:..... Time related:.....	Item	R	-
A	B11.10 Instruction manuals and guarantees	Fixed:..... Value related:..... Time related:.....	Item	R	-
B	B11.11 As built information	Fixed:..... Value related:..... Time related:.....	Item	R	-
Total Carried Forward				R	-

Total Brought Forward			R	-
C	B11.12 Tenant installations Fixed:..... Value related:..... Time related:.....	Item	R	-
B12.05 SCHEDULE OF VARIABLES				
D	B12.1 Schedule of variables Fixed:..... Value related:..... Time related:.....	Item	R	-
This schedule contains all variables referred to in this document and is divided into pre-tender and post-tender categories. The pre-tender category must be completed in full and included in the tender documents. Both the pre-tender and post-tender categories form part of these Preliminaries Spaces requiring information must be filled in, shown as "not applicable" or deleted and not left blank. Where choices are offered, the non-applicable items are to be deleted. Where insufficient space is provided the information should be annexed hereto and cross-referenced to the applicable clause of the schedule. Key cross reference clauses are italicised in [] brackets 12.1 PRE-TENDER INFORMATION 12.1.1 Provisional bills of quantities [2.2] The quantities are provisional ~~YES~~ 12.1.2 Availability of construction documentation [2.3] Construction documentation is complete ~~NO~~ 12.1.3 ~~Interests of agents [2.4]~~ ~~Details:~~ 12.1.4 ~~Defined works area [3.1]~~ ~~Details:~~ 12.1.5 ~~Geotechnical investigation [3.2]~~ ~~Details:~~ 12.1.6 ~~Existing premises occupied [3.4]~~ ~~Specific requirements:~~ 12.1.7 ~~Previous work - dimensional accuracy [3.5]~~ ~~Details:~~ 12.1.8 ~~Previous work - defects [3.6]~~ ~~Details:~~ 12.1.9 Services - known [3.7] Details: All known services to be pointed out to the contractor ~~On site handover~~ 12.1.10 ~~Protection of trees [3.9]~~ ~~Specific requirements:~~ 12.1.11 ~~Inspection of adjoining properties [3.11]~~ ~~Specific requirements:~~ 12.1.12 Enclosure of the works [6.2] Specific requirements: The demolition and new construction works including temporary accommodation to be enclosed as required for the protection and safety of the ~~learners~~ and the community 12.1.13 Offices [6.4.3] Specific requirements: The contractor shall provide, maintain and remove on completion of the works an office for the exclusive use of the principal agent, minimum size 4 x 3 x 3m high internally, suitably insulated and ventilated, provided with electric lighting and fitted with boarded floor, desk, chair, drawing stool, drawing board and lock-up drawers for drawings. The office shall be kept clean and fit for use at all times				
Total Carried Forward			R	-

Total Brought Forward 12.1.14 Main notice board [6.5] Specific requirements: The contractor shall provide, erect where directed, maintain and remove on completion of the works a notice board size 3 x 3m as type Drawing GEN 063, constructed of suitable boarding with flat smooth surface and with edging bead 19mm thick round outer edges and projecting 12mm from face of boarding and rounded on front edge. The board shall be securely fixed to hoarding, where hoarding is provided, or fixed to and including a suitable supporting structure of timber or tubular posts and braces. The board is to be painted ivory white and the bead and 12mm wide dividing lines dark green. All wording shall be inscribed in dark green as per the coat of arms for SA. All wording shall be inscribed in dark green painted sans serif lettering 12.1.15 Subcontractors' notice board [6.6] A notice board is required NO Specific requirements: 12.1.16 Water [7.2] Option A (by contractor) YES Option B (by employer - free of charge) NO Option C (by employer - metered) NO 12.1.17 Electricity [7.3] Option A (by contractor) YES Option B (by employer - free of charge) NO Option C (by employer - metered) NO 12.1.18 Telecommunications [7.4] Telephone YES Facsimile YES E-mail YES 12.1.19 Ablution facilities [7.5] Option A (by contractor) YES Option B (by employer) NO 12.1.20 Protection of existing/sectionally occupied works [11.2] Protection is required YES/NO 12.1.21 Special attendance [9.2] Subcontractor (1) details: Subcontractor (2) details: Subcontractor (3) details: Subcontractor (4) details: 12.1.22 Protection of the works [11.1] Specific requirements: 12.1.23 Disturbance [11.5] Specific requirements: The contractor shall keep the site, structures, etc well watered during operations to prevent dust and shall provide and erect and remove on completion of the works all necessary temporary dust screens all to the satisfaction of the principal agent. 12.1.24 Environmental disturbance [11.6] Specific requirements: All work to be carried out in accordance with the requirements as set out in the Environmental Specification 12.2 POST TENDER INFORMATION 12.2.1 Payment of preliminaries [10.2] Option A (prorated) YES/NO Option B (calculated) YES/NO 12.2.2 Adjustment of preliminaries [10.3] Option A (three categories) YES/NO Option B (detailed breakdown) YES/NO 12.2.3 Additional agreed preliminaries items Details:	R -
Total Carried Forward	R -

Total Brought Forward		R	-
SECTION C: SPECIFIC PRELIMINARIES			
A	C1. OCCUPATIONAL HEALTH AND SAFETY ACT The contractor shall comply with all the requirements set out in the Construction Regulations, 2003 issued under the Occupational Health and Safety Act, 1993 (Act No 85 of 1993). It is required of the contractor to thoroughly study the Health and Safety Specification that must be read together with and is deemed to be incorporated under this Section of the bills of quantities. The contractor must take note that compliance with the Occupational Health and Safety Act, Construction Regulations and Health and Safety Specification is compulsory. In the event of partial or total non-compliance, the principal agent, notwithstanding the provisions of clause A31.0 of Section A or any other clause to the contrary, reserves the right to delay issuing any progress payment certificate until the contractor provides satisfactory proof of compliance. The contractor shall not be entitled to any compensation of whatsoever nature, including interest, due to such delay of payment. Provision for pricing of the Occupational Health and Safety Act, Construction Regulations and Health and Safety Specification is made under this clause and it is explicitly pointed out that all requirements of the aforementioned are deemed to be priced hereunder and no additional claims in this regard shall be entertained Fixed:..... Value related:..... Time related:.....		
	Item	R	-
B	C2. PROPRIETARY BRANDED PRODUCTS The contractor shall take delivery of, handle, store, use apply and/or fix all proprietary branded products in strict accordance with the manufacturers instruction after consultation with the manufacturer's authorised representative Fixed:..... Value Related:..... Time Related:.....		
	Item	R	-
C	C3. OVERTIME Should overtime be required to be worked for any reason whatsoever, the costs of such overtime are to be borne by the contractor unless the principal agent has specifically authorised in writing, prior to the execution thereof, that costs for such overtime are to be borne by the employer. Fixed:..... Value Related:..... Time Related:.....		
	Item	R	-
D	C4. AS BUILT DRAWINGS Not applicable Fixed:..... Value Related:..... Time Related:.....		
	Item	R	-
E	C5. SITE INSTRUCTIONS Site instructions issued on site are to be recorded in triplicate in a site instruction book which is to be maintained on site by the contractor Fixed:..... Value Related:..... Time Related:.....		
	Item	R	-
A	C6. LABOUR RECORD At the end of each week the contractor shall provide the principal agent with a written record, in schedule form, reflecting the number and description of tradesmen and labourers employed by him and all subcontractors on the works each day. Fixed:..... Value Related:..... Time Related:.....		
	Item	R	-
B	C7. PLANT RECORD At the end of each week the contractor shall provide the principal agent with a written record, in schedule form, reflecting the number, type and capacity of all plant, excluding hand tools, currently used on the works. Fixed:..... Value Related:..... Time Related:.....		
	Item	R	-
Total Carried Forward		R	-

Total Brought Forward			R	-
C	C8. NON CESSION OF MONIES The contractor shall not cede nor assign his rights or claims to any monies due or to become due under this contract Fixed:..... Value Related:..... Time Related:.....	Item	R	-
MATERIALS AND WORKMANSHIP				
D	Not applicable	Item	R	-
Guarantees				
	The contractor shall obtain written guarantees where called for, addressed to the employer, from the firms supplying the materials or doing the work and deliver such guarantees to the principal agent. The guarantees shall state that workmanship, materials and installation are guaranteed for a specified period reckoned from the date of practical completion of the works and that any defects in the workmanship, materials and installation that may arise during that period shall be made good at the expense of the firm doing the work upon written notice from the principal agent or the employer to do so	Item	R	-
FINANCIAL ASPECTS				
Overtime				
A	The additional costs of overtime work shall be for the employer's account only when prior written agreement thereto is given by the principal agent	Item	R	-
MONITORING				
B	Additional financial provision, for the requirements of the Occupational Health and Safety Act including safety plans, files etc	Item	R	-
Total Carried to Summary			R	-

BILL NO. 2

ITEM NO	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	<u>ALTERATIONS</u> <u>PREAMBLES</u> Tenderers are advised to study the Model Preambles for Trades 2008 published by the Association of South African Quantity Surveyors <u>SUPPLEMENTARY PREAMBLES</u> All Tenderers will be deemed to have visited the site prior to submitting their tender to determine the nature and extent of the alteration and demolition work and the value of the materials to be recovered. No claim for a variation in the credit allowance for recoverable materials in respect of demolition items will be considered. All sizes and dimensions stated herein are approximate and deemed only sufficient to identify the item of work concerned. In taking down and removing existing work the utmost care must be taken to avoid any structural or other damage to the remaining portions of the building and the Contractor shall provide all shoring, needling, strutting, etc. to ensure the stability of all structures during the alteration/demolition work. The Contractor will be held solely responsible for the safety and stability of the buildings for the whole period of the contract and must make good any damage at his own expense. Existing services must be maintained at all times to the existing buildings. If it is found necessary to disconnect any service then suitable temporary or alternate services must be provided to the existing buildings. Special care shall be exercised during the progress of the work to ensure that any electrical installation, water supply pipes, telephone and other services which may be encountered are not interfered with and notice must be given to the Principal agent if any disconnection or alterations become necessary. The Contractor shall cover up and protect from injury all work not removed and shall make good at his own expense any damage that may occur. Any water supply or other piping, etc. that may be encountered and found necessary to disconnect or cut are to be effectually stopped off and any new connections that may be necessary shall be made with the proper fittings to the satisfaction of the Principal Agent. Where sanitary fittings, geysers, etc. are to be removed the Contractor shall allow for removing all exposed waste or water supply pipes to the nearest suitable junction or connection and stopping off, as well as for making good plaster, screeds, etc.. Prices for the removal of concrete slabs, etc. must include for removal of reinforcement, screeds, membrane waterproofing, conduits, etc.. Prices for the removal of concrete surface beds, etc. must include for removal of reinforcement, screeds, conduits, damp proof membrane, etc.. The Contractor is to note that removal of the existing floor finishes such as vinyl, carpets, ceramic tiles, etc. has been measured separately. Removal of doors, windows, fittings, etc. is to include for their removal complete with frames, ironmongery, glass, quadrants, architraves, skirtings, burglar bars and all accessories to walls, reveals, around openings, for cutting out cills, etc., for hacking up flooring at openings and for making good. Removal of sanitary fittings is to include for the removal and blocking off of service pipes, taps, traps, fixing brackets, cisterns, etc. complete.				

Building up of existing openings where given in number shall be deemed to include preparing existing surfaces all round, brickwork properly toothed and bonded to existing and shot pinned to concrete, wedging up and unless otherwise stated making good finishes on both sides to match existing. Allow for watering the works sufficiently to prevent nuisance from dust. OLD MATERIALS TO BE CARTED AWAY: Old materials from the alterations, except where described to be re-used or handed over, as well as all rubbish, rubble, debris etc., must be regularly carted from the site and not be allowed to accumulate on or around the site. OLD MATERIALS NOT TO BE RE-USED: None of the old materials are to be used for new work except where specifically described as being set aside for re-use. OLD MATERIALS TO BECOME THE PROPERTY OF THE CONTRACTOR: Old materials from alterations, except where described to be re-used or handed over, become the property of the Contractor who must allow credit for same in the Final Summary. HANDING OVER OF MATERIALS: Where certain materials or articles from demolitions or articles are described as to be handed over by the Contractor to the Regional Representative or Representative/Agent, such materials or articles shall be properly stored by the Contractor, until handing over thereof. The Contractor must obtain an official receipt listing the materials or articles and dates of handing over. If the Contractor fails to submit the receipt when requested, it shall be deemed that the materials or articles are still in his possession and he will be held liable to the Department for the full replacement value thereof, which amount will be deducted from any monies due to the Contractor. TRADE NAMES Where an item is referred to by a Trade name or catalogue number, it may be replaced by another product of equal quality with the prior approval of the Principal Agent. CONTRACT PRICE ADJUSTMENT PROVISIONS Unless otherwise stated herein, all items in this bill shall be deemed to fall into Work Group No. 102 for JBCC CPAP purposes TEMPORARY BARRIERS, SCREENS, ETC. Temporary barriers, screens, etc. including removal					
A	Allowance for all necessary temporary tarpaulins, barricades, screens, fencing, temporary waterproofing, dustproofing, etc. required to isolate any sections of new or existing buildings for purposes of renovations and excluding users of the remainder of the building or any unauthorised persons all to the satisfaction of the Principal Agent	Item	1.00	R	-
Temporary hoarding fence around building to be constructed including erection and dismantling at contract completion					
A	3000mm High diamond mesh fence with and including shade cloth covering on one side, including all corners, straining and support posts, droppers, straining wire, earthworks and necessary concrete bases, executed complete	m	50.00	R	-
B	2500mm High x 1000mm wide diamond mesh clad pedestrian gate, gate frame, straining and support posts, straining wire, bolts and lock set, earthworks and necessary concrete bases, executed complete	No	1.00	R	-
Total Carried Forward				R	-

Total Brought Forward			R	-
<u>THE FOLLOWING IN DEMOLITIONS TO CREATE NEW OPENING FOR FIRE ESCAPE STAIRCASE</u>				
Break down and remove brickwork etc. and make good finishes to match existing				
C	220mm brick wall	m ²	21.00	R -
<u>Breaking down and removing brickwork etc</u>				
D	Half brick walls	m ²	47.00	R -
E	One brick walls	m ²	102.00	R -
<u>REMOVAL OF EXISTING WORK</u>				
<u>Taking down and removing</u>				
F	Steel diamond mesh security fence with steel posts and droppers and 45 degree barbed wire overhang, 1.8m high overall, including concrete footings	m	125.00	R -
Hacking up existing floor finishes and prepare surfaces for new floor finish				
G	Ceramic/Porcelain tiles including preparing surfaces to receive new screed and floor finish (new screed and floor finish elsewhere measured)	m ²	163.00	R -
H	25mm Thick screed including preparing surfaces to receive new screed and floor finish (new screed and floor finish elsewhere measured)	m ²	1,619.00	R -
<u>TAKE OUT AND REMOVE CEILINGS</u>				
Take out and remove existing ceilings				
A	Gypsum plasterboard ceilings, brandering, coverstrips and cornices	m ²	364.00	R -
B	Suspended steel ceilings including framework	m ²	64.00	R -
<u>DEMOLISH/REMOVE WALLS, PARTITIONS, WALL FINISHES ETC..</u>				
Break down and remove brickwork etc. and make good finishes to match existing				
C	Half brick wall	m ²	5.00	R -
D	One brick wall	m ²	364.00	R -
Take out and remove existing partitions				
E	Drywall partitions including framework, doors, windows, insulation, etc..	m ²	876.00	R -
Hacking up existing floor finishes and prepare surfaces for new floor finish				
F	30mm Thick screed including preparing surfaces to receive new screed and floor finish (new screed and floor finish elsewhere measured)	m ²	1,041.00	R -
Scabble existing surface of plastered wall and prepare surface to receive new plaster (new plaster elsewhere measured)				
G	On walls	m ²	535.00	R -
Total Carried Forward			R	-

Total Brought Forward				R	-
TAKE OUT ROOF COVERINGS					
Take out and remove roof coverings					
H	Metal roof sheeting	m ²	312.00	R	-
TAKE OUT AND REMOVE DOORS, WINDOWS, SHOPFRONTS, ETC..					
Careful taking out and removing windows, etc. including thresholds, sills, etc (building up openings and making good finishes elsewhere)					
PRESSED STEEL DOOR FRAMES					
Take out and remove doors, frames and windows, etc. from brickwork and prepare opening to receive new doors, frames, windows, etc. (new doors, frames and windows elsewhere measured)					
<u>1.6mm Double rebated frames with three hinges suitable for half brick walls</u>					
A	Timber single door and steel frame, overall size 813 x 2032mm high	No	26.00	R	-
TAKE OUT AND REMOVE SANITARY FITTINGS, PIPING ETC..					
Take out and remove piping, sanitary fittings, taps, traps and fixing brackets, etc. including disconnecting piping from fittings, blocking off existing redundant pipes, fittings, etc. and making good floor and wall finishes					
B	Vitreous china wash hand basin including 2 bip taps	No	7.00	R	-
C	Vitreous china WC pan with cistern	No	9.00	R	-
D	Single Bowl Sink As per Item No.70/261	No	1.00	R	-
<u>Geysers</u>					
E	50 Litre geyser including all fittings As per Item No.70/264	No	2.00	R	-
<u>Taps</u>					
F	Shower Rose	No	9.00	R	-
G	Shower trap	No	9.00	R	-
H	Star taps to showers	No	9.00	R	-
<u>Sanitary fittings sundries</u>					
I	Stainless steel soap dispenser	No	4.00	R	-
J	Stainless steel hand dryer	No	2.00	R	-
K	Steel four tier toilet roll holder As per Item No.71/276	No	9.00	R	-
BUILDING UP OPENINGS					
Brickwork in NFP bricks in class II mortar in building up openings including cutting, toothing, etc. (finishes elsewhere measured)					
A	Opening, size 4900 x 3600mm high in 220mm brick walls	No	6.00	R	-
TAKE OUT AND REMOVE GATES, ROLLER SHUTTERS, BURGLAR BARS, ETC..					
Take out and remove gates, grilles, burglar bars, etc.					
B	Steel roller shutter gate, size 4600 x 3500mm high	No	6.00	R	-
Total Carried Forward				R	-

		Total Brought Forward			R	-
		<u>Clean and remove rust from steel columns with wire brush</u>				
C	Various diameters of steel columns	t	3.00		R	-
		<u>PREPARATORY WORK TO EXISTING SURFACES</u>				
		Making good of finishes, etc.				
D	Making good brickwork at end of one brick wall where windows and doors have been removed	m	18.00		R	-
E	Raking out joints of existing face brickwork to receive plaster finish	m ²	150.00		R	-
		<u>MAKING GOOD OF FINISHES ETC</u>				
		<u>Making good face brickwork</u>				
F	Faces of walls where doors and windows were removed	m	11.00		R	-
		<u>Making good cement screeds</u>				
		Screeds				
G	Make good floors with new 30mm screed	m ²	1,821.00		R	-
		<u>Making good internal cement plaster</u>				
H	Walls in patches	m ²	280.00		R	-
		TESTING, SCANNING AND VERIFYING EXISTING WORK				
		Making good of finishes, etc.				
I	Make good external asphalt surface	m ²	516.00		R	-
A	General testing of existing work, coring, drilling and scanning of concrete and masonry works, roof trusses installation, etc	Item	1,00			
Total Carried to Summary					R	-

<u>BILL NO. 3</u> <u>EARTHWORKS</u> <u>STANDARD PREAMBLES</u> The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles <u>SUPPLEMENTARY PREAMBLES</u> <u>Nature of ground</u> A soil investigation has been carried out on the site by the engineer and the report is annexed to these bills of quantities. The soil report indicates that the ground varies between silty sand, reworked soil of mixed origin and residual shale, all of which will be deemed as "earth". All very hard unweathered shale, ironstone, etc, the removal of which necessitates the use of explosives or heavy duty hydraulic percussion hammers (peckers), will be classified as "hard rock" <u>Subterranean water</u> No subterranean water is expected <u>Excavation for working space in rock</u> Notwithstanding clause 11 page 8 of the Standard System of Measuring Building Work, excavation for working space in rock will be measured in cubic metres to the extent executed and given as "extra over" bulk excavation or trench and hole excavation as the case may be <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 <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 <u>Testing</u> Prices for filling are to include for all necessary density tests in accordance with SABS 1200D <u>Labour intensive methods</u> The contractor will be required to use labour intensive methods for the items which have been marked with the letters "LI" as described in the Scope of Work The following in workgroup 104 <u>BULK EXCAVATION, FILLING, ETC</u> <u>EXCAVATIONS ETC</u> <u>Excavation in earth not exceeding 2m deep</u>					
A	Reduced levels under floors	m ³	348.00	R	-
Total Carried Forward				R	-

Total Brought Forward				R	-
	<u>Extra over all excavations for carting away</u>				
B	Surplus material from excavations and/or stock piles on site to a dumping site to be located by the contractor (LI)	m ³	6.00	R	-
	FILLING ETC				
	<u>Earth filling obtained from the excavations and/or prescribed stock piles on site, compacted to 93% Mod AASHTO density</u>				
C	Under floors, steps, pavings, etc (LI)	m ³		Rate Only	
	<u>Filling of gravel-soil material G7 supplied by the contractor, compacted to 93% Mod AASHTO density</u>				
D	Under floors, steps, pavings, etc (LI)	m ³	239.00	R	-
	<u>Filling of gravel-soil material G6 supplied by the contractor, compacted to 93% Mod AASHTO density</u>				
A	Under floors, steps, pavings, etc (LI)	m ³		Rate Only	
	<u>Compaction of ground surfaces</u>				
B	Compaction of natural or excavated ground surface under floors etc, including scarifying for a depth of 150mm, breaking down oversize material, adding suitable material where necessary and compacting to 93% Mod AASHTO density (LI)	m ²	819.00	R	-
	EXCAVATION, FILLING, ETC				
	<u>Excavation in earth not exceeding 2m deep</u>				
C	Trenches (LI)	m ³	6.00	R	-
	<u>Extra over trench and hole excavations in earth for excavation in</u>				
D	Soft rock	m ³	1.00	R	-
E	Hard rock	m ³	1.00	R	-
	<u>Back excavation of vertical sides of excavations in earth for working space including backfilling compacted to 93% Mod AASHTO density</u>				
F	Not exceeding 500mm deep for placing and removing formwork to walls etc, 300mm away from excavated face	m ²	16.00	R	-
	<u>Keeping works free of water</u>				
G	Allow for the baling, pumping or otherwise in keeping the works free from all water or mud	Item	1.00	R	-
	<u>Risk of collapse of excavations</u>				
H	Sides of trench and hole excavations not exceeding 1,5m deep	m ²	16.00	R	-
	FILLING ETC				
	<u>Earth filling obtained from the excavations and/or prescribed stock piles on site, compacted to 93% Mod AASHTO density</u>				
I	Backfilling to trenches (LI)	m ³	6.00	R	-
	<u>Filling of coarse river sand supplied by the contractor, consolidated</u>				
A	Under floors etc (LI)	m ³	41.00	R	-
	WEED KILLERS, INSECTICIDES, ETC				
	<u>Approved brand of anti-termite soil poison applied by a Registered Pest Control company and guaranteed against termite infestation for ten years</u>				
Total Carried Forward				R	-

Total Brought Forward				R	-
A	Under floors etc including forming and poisoning shallow furrows against foundation walls etc, filling in furrows and ramming (LI)	m ²	819.00	R	-
B	Sides and bottom of trenches and holes (LI)	m ²	29.00	R	-
TESTS					
<u>Prescribed tests to determine degree of compaction or other properties of ground or filling</u>					
C	"Modified AASHTO Density" test	No	5.00	R	-
D	"Natural California Bearing Ratio" test	No	5.00	R	-
E	"Field Density" test, including "Optimum Moisture Content" test (four readings per test)	No	5.00	R	-
Total Carried to Summary				R	-

<u>BILL NO. 4</u>					
<u>CONCRETE, FORMWORK AND REINFORCEMENT</u>					
<u>STANDARD PREAMBLES</u>					
The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles					
<u>SUPPLEMENTARY PREAMBLES</u>					
Cost of tests					
The costs of making, storing and testing of concrete test cubes as required under clause 7 "Tests" of SABS 1200 G shall include the cost of providing cube moulds necessary for the purpose, for testing costs and for submitting reports on the tests to the architect. The testing shall be undertaken by an independent firm or institution nominated by the contractor to the approval of the engineer. (Test cubes are measured separately)					
Description 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					
Formwork					
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 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"					
<u>Labour intensive methods</u>					
The contractor will be required to use labour intensive methods for the items which have been marked with the letters "LI" as described in the Scope of Work					
NOTE: All items in this section shall be deemed to fall into Work Group 110 for Haylett formula purposes					
<u>UNREINFORCED CONCRETE CAST AGAINST EXCAVATED SURFACES</u>					
<u>15MPa/19mm concrete</u>					
A	Blanding under footings and bases (LI)	m ³	3.00	R	-
<u>REINFORCED CONCRETE CAST AGAINST EXCAVATED SURFACES</u>					
<u>Concrete 25 MPa/19mm stone in:</u>					
B	Strip footings (LI)	m ³	17.00	R	-
C	Ramps (LI)	m ³	5.00	R	-
D	Aprons	m ³	3.00	R	-
<u>Concrete 30 MPa/19mm stone in:</u>					
E	Surface beds and thickenings (LI)	m ³	123.00	R	-
Total Carried Forward				R	-

Total F Brought Forward			R	-
REINFORCED CONCRETE CAST ON/IN FORMWORK				
F	Stairs including landings, beams and inverted beams (LI)	m ³	10.00	R -
ROUGH FORMWORK (DEGREE OF ACCURACY II)				
<u>Rough formwork to sides</u>				
G	Edges, risers, ends and reveals not exceeding 300mm high	m	41.00	R -
TEST BLOCKS				
H	Making and testing 150 x 150 x 150mm concrete strength test cube (Provisional)	No	200.00	R -
CONCRETE SUNDRIES				
<u>Finishing top of surfaces of concrete with a power float</u>				
I	Pavings, surface beds, slabs, etc to falls	m ²	10.00	R -
<u>Finishing top of surfaces of concrete with a wood float finish</u>				
A	Pavings, surface beds, slabs, etc to falls (LI)	m ²	248.00	R -
<u>Finishing top surfaces of concrete smooth with a power float with high quality grey epoxy, non-metallic commercial hardener added (7kg/m² in two operations), curing with curing compound at a rate of 7-10m²/l, subsequently removing curing compound and sealing with suitable sealer at a rate of 7m²/l</u>				
B	Surface beds, slabs, etc	m ²	1,649.00	R -
MOVEMENT JOINTS ETC				
<u>Expansion joints with 10mm soft board between vertical concrete and brick surfaces</u>				
C	Not exceeding 300mm high to edges of surface beds (LI)	m	200.00	R -
<u>Saw cut joints</u>				
D	6 x 25mm Saw cut joints on top of concrete	m	15.00	R -
NOTE: All items in this section shall be deemed to fall into Work Group 114 for Haylett formula purposes				
REINFORCEMENT (PROVISIONAL)				
<u>Steel rod reinforcement to structural concrete work (Note: the following item has not been separated into various diameters and this principle will apply when remeasuring the item)</u>				
E	Various diameters of steel reinforcement	t	2.00	R -
<u>Fabric reinforcement</u>				
F	Type 193 reinforcement in concrete surface beds, slabs, etc (LI)	m ²	682.00	R -
Total Carried to Summary			R	-

<u>BILL NO. 5</u>					
<u>MASONRY</u>					
<u>STANDARD PREAMBLES</u>					
The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles					
<u>SUPPLEMENTARY PREAMBLES</u>					
<u>BRICKWORK</u>					
<u>Sizes in descriptions</u>					
Where sizes in descriptions are given in brick units, "one brick" shall represent the length and "half brick" the width of a brick					
<u>Hollow walls</u>					
Descriptions of hollow walls shall be deemed to include leaving every fifth perpend of the bottom course of the external skin open as a weep hole					
<u>Bagged and sealed walls</u>					
Walls in two skins described as "bagged and sealed" shall be deemed to include having the outer face of the inner skin bagged with 1:6 cement and sand mixture and sealed with two coats bitumen emulsion waterproofing coating					
<u>Face bricks</u>					
Bricks shall be ordered timeously to obtain uniformity in size and colour					
<u>Pointing</u>					
Descriptions of recessed pointing to fair face brickwork and face brickwork shall be deemed to include square recessed, hollow recessed, weathered pointing, etc					
<u>Labour intensive methods</u>					
The contractor will be required to use labour intensive methods for the items which have been marked with the letters "LI" as described in the Scope of Work					
NOTE: All items in this section shall be deemed to fall into Work Group 116 for Haylett formula purposes					
<u>BRICKWORK</u>					
<u>FOUNDATIONS (PROVISIONAL)</u>					
<u>Brickwork of NFX bricks (14 MPa nominal compressive strength) in class II mortar</u>					
A	One brick walls (LI)	m ²	118.00	R	-
<u>2.5mm Brickwork reinforcement</u>					
B	150mm Wide reinforcement built in horizontally (LI)	m	218.00	R	-
<u>FACE BRICKWORK</u>					
<u>Face bricks (PC amount R5000.00/1000) pointed with recessed horizontal and vertical joints</u>					
C	Extra over brickwork for face brickwork (LI)	m ²	35.00	R	-
<u>SUPERSTRUCTURE</u>					
<u>Prestressed fabricated concrete lintels including necessary temporary supports</u>					
D	110 x 75mm Lintels in lengths not exceeding 3m (LI)	m	32.00	R	-
Total Carried to Summary				R	-

<u>BILL NO. 6</u>					
<u>WATERPROOFING</u>					
<u>STANDARD PREAMBLES</u>					
The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles					
<u>SUPPLEMENTARY PREAMBLES</u>					
<u>Waterproofing</u>					
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					
<u>Labour intensive methods</u>					
The contractor will be required to use labour intensive methods for the items which have been marked with the letters "LI" as described in the Scope of Work					
NOTE: All items in this section shall be deemed to fall into Work Group 120 for Haylett formula purposes					
<u>DAMPPROOFING OF WALLS AND FLOORS</u>					
<u>One layer 250 micron green polyethylene waterproof sheeting (SANS 952-1985 type C) sealed at laps with PVC self-adhesive tape</u>					
A	Under surface beds (LI)	m ²	793.00	R	-
<u>One layer 375 micron embossed polyethylene dampproof course (SANS 952-1985 type B)</u>					
B	In walls (LI)	m ²	252.00	R	-
<u>SEALING STRIPS, JOINT SEALANTS, ETC</u>					
<u>Pre-compressed bitumen impregnated foam plastic joint sealing strips</u>					
A	10 x 15mm In expansion joints (LI)	m	98.00	R	-
Total Carried to Summary				R	-

BILL NO. 7					
ROOF COVERINGS					
STANDARD PREAMBLES					
The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles					
<u>Labour intensive methods</u>					
The contractor will be required to use labour intensive methods for the items which have been marked with the letters "LI" as described in the Scope of Work					
NOTE: All items in this section shall be deemed to fall into Work Group 124 for Haylett formula purposes					
PROFILED METAL SHEETING AND ACCESSORIES					
<u>0,58mm Klip-tite profile galvanised sheet steel in single lengths and accessories with chromadek finish on one side, fixed to timber purlins or brandering</u>					
A	Roof covering with pitches not exceeding 25 degrees	m ²	238.00	R	-
B	Ridge coverings 500mm girth	m	59.00	R	-
C	Valley covering 600mm girth	m	22.00	R	-
D	Cover flashings 350mm girth	m	10.00	R	-
E	Side wall flashings 350mm girth	m	50.00	R	-
F	Head wall flashings 550mm girth	m	50.00	R	-
G	Narrow and broad flute closers 35mm girth	m	619.00	R	-
SHEET METAL FLASHINGS, LININGS, COPINGS, ETC					
<u>0,6mm Galvanised sheet steel</u>					
A	Flashings	m ²	10.00	R	-
ROOF AND WALL INSULATION					
B	Double sided reflective aluminium foil faced insulation barrier, with reflective facing to be exposed to roof sheets	m ²	238.00	R	-
Total Carried to Summary				R	-

BILL NO. 8					
CARPENTRY AND JOINERY					
STANDARD PREAMBLES					
The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles					
SUPPLEMENTARY PREAMBLES					
<u>Fixing</u>					
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					
Items described as "plugged" shall be deemed to include screwing to fibre, plastic or metal plugs at not exceeding 500mm centres, and where described as "bolted", the bolts have been given elsewhere					
<u>Joinery</u>					
Descriptions of frames shall be deemed to include frames, transomes, rails, etc					
Descriptions of hardwood joinery shall be deemed to include sinking and pelleting heads and nuts of bolts					
<u>Decorative thermosetting plastic laminate covering</u>					
Laminate covering shall be glued under pressure and edge strips of same shall be butt jointed at junctions with adjacent similar finish					
<u>Labour intensive methods</u>					
The contractor will be required to use labour intensive methods for the items which have been marked with the letters "LI" as described in the Scope of Work					
NOTE: All items in this section shall be deemed to fall into Work Group 126 for Haylett formula purposes					
ROOFS ETC					
FLOORS AND SKIRTINGS					
SKIRTINGS					
<u>Wrought meranti</u>					
A	76 x 19mm Skirtings with 19mm meranti quadrant, nailed	m	24.00	R	-
B	22mm Quadrant, nailed	m	12.00	R	-
TIMBER DOORS, WINDOWS, ETC					
DOORS ETC					
<u>Hollow core doors hung to timber frames</u>					
A	44mm Framed, ledged and braced batten door 813 x 2032mm high to Architect's specification(D1)	No	11.00	R	-
B	44mm Framed, ledged and braced batten door 813 x 2032mm high to Architect's specification(D2)	No	2.00	R	-
<u>44mm semi-solid hardwood doors to Architect's specification</u>					
C	44mm Door 1510 x 2032mm high (D07)	No	2.00	R	-
<u>Solid hardwood doors to Architect's specification</u>					
D	40mm Door 813 x 2032mm high solid hardwood fire door(D05)	No	5.00	R	-
E	44mm Door 813 x 2032mm high (D07)	No	2.00	R	-
Total Carried Forward				R	-

Total Brought Forward				R	-
CUPBOARDS TO KITCHENS, BEDROOMS, ETC					
<u>SUPPLEMENTARY PREAMBLES</u>					
<u>General</u>					
The following cupboard fittings are given as complete units i.e. the components of the units have not been given separately. Descriptions of such units shall, therefore, be deemed to include all components, assembling, housing, notching, glueing, blocking, planting-on and screwing with countersunk screws, edge strips, thermosetting plastic laminate, glass, ironmongery, metalwork, paint or varnish finishes, etc. Prices are to include for all necessary filler pieces against walls etc					
<u>References</u>					
References given in descriptions refer to the respective types of fittings detailed on the architect's drawing(s) numbered annexed to these bills of quantities (accompanying these bills of quantities) for tender purposes					
<u>Cupboards hinges, handles and telescopic drawer slides</u>					
F	Kitchen floor cupboard 4900 x 900mm high with top, sides, bottom, division, shelf, back and double hinged doors, necessary framework as per Architect detail No.DT264	No	1.00	R	-
Total Carried to Summary				R	-

BILL NO. 9					
CEILINGS, PARTITIONS AND ACCESS FLOORING					
STANDARD PREAMBLES					
The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles					
<u>Labour intensive methods</u>					
The contractor will be required to use labour intensive methods for the items which have been marked with the letters "LI" as described in the Scope of Work					
NOTE: All items in this section shall be deemed to fall into Work Group 129 for Haylett formula purposes					
CEILING TIMBERS, BEADS, INSULATION, ETC					
INSULATION					
<u>Non-combustible fibreglass insulation of a density of not less than 10kg/m3 bonded with an inert thermo-setting resin.</u>					
A	120mm Insulation in blanket form closely fitted and laid on top of branderling between roof timbers etc	m ²	334.00	R	-
NAILED-UP CEILINGS					
SUPPLEMENTARY PREAMBLES					
<u>Openings</u>					
Prices for openings for light fittings, ventilation grilles, air conditioning diffusers, etc are to include for any necessary additional support, trimming around, etc					
<u>6.4mm Fibre-cement plain ceiling boards with H-profile galvanised steel jointing strips</u>					
B	Ceilings including 38 x 38mm sawn softwood branderling at 300mm centres and cross branderling at 300mm centres	m ²	334.00	R	-
A	Extra over ceiling for 600 x 600mm trap door of 38 x 38mm wrought softwood rebated framing with one cross brander, covered with ceiling board and fitted flush in opening, including necessary trimmers around	No	5.00	R	-
<u>Fibre cement cornices</u>					
B	75mm Coved cornices	m	259.00	R	-
PARTITIONS ETC					
Partitions consisting of 48mm (70mm? 92mm? 146?) galvanised steel studs at 610mm centres as vertical support secured in matching galvanised steel floor and ceiling channels, clad on one or both sides as described, including additional studs as necessary at abutments, ends, etc. Board cladding shall be fixed and jointed in strict accordance with the manufacturer's instructions					
Unless otherwise described, prices for partitions shall be deemed to include for standard flat section aluminium skirting on boarded sides					
Wall paper and paint or varnish finishes are given separately					
Total Carried Forward				R	-

Total Brought Forward			R	-
DRYWALL PARTITIONS				
"Rhino-Drywall" or equivalent partitioning shall comprise of steel studding formed of 63.5mm top and bottom tracks with vertical studs at maximum 600mm centres, friction fitted or pop riveted to the top and bottom tracks with similar additional vertical studs as necessary at abutments, ends, etc. and covered as described with wallboard screwed to studding with "Drywall" screws at maximum 220mm centres. Boards are to butt jointed and finished with "Rhino-tape" and "Ready-mix D" jointing compound all in accordance with the manufacturer's instructions. Intersections and abutments are measured separately and descriptions shall be deemed to include any additional studs, corner beads, jointing compound, tape, skirtings, etc.				
C	Partitions 3.6m high with bottom and top tracks plugged	m	101.00	R -
D	Extra over partition 3.6m high for vertical abutment	No	35.00	R -
E	Extra over partition 3.6m high for T-intersection	No	10.00	R -
F	Extra over partition 3.6m high for corner	No	15.00	R -
Extra over partitions for 40mm semi-solid flush doors with commercial veneer on both sides and hardwood edge strips to vertical edges, hung to and including standard natural anodised aluminium door frame with one pair of 100mm nylon washered aluminium hinges to each hanging stile, including additional studding, trimming, etc. to partitions				
A	Door 810 x 2135mm high including lockset to be prescribed by the Architect	No	15.00	R -
Total Carried to Summary			R	-

BILL NO. 10 FLOOR COVERINGS, WALL LININGS, ETC STANDARD PREAMBLES The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles SUPPLEMENTARY PREAMBLES Fixing Floor coverings, wall linings, etc shall, where applicable, be fixed with adhesive as recommended by the manufacturers of the flooring, linings, etc <u>Labour intensive methods</u> The contractor will be required to use labour intensive methods for the items which have been marked with the letters "LI" as described in the Scope of Work NOTE: All items in this section shall be deemed to fall into Work Group 130 for Haylett formula purposes FLOOR COVERINGS 2.0mm Thick fully flexible vinyl sheeting with welded joints A On floors POLISH, SEALERS, ETC B Two coats wax polish on vinyl flooring		m2		Rate Only
		m2		Rate Only
Total Carried to Summary				R -

BILL NO. 11					
IRONMONGERY					
STANDARD PREAMBLES					
The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles					
SUPPLEMENTARY PREAMBLES					
<u>Proprietary items</u>					
Where applicable the manufacturers' names or product catalogue titles are given in sub-headings preceding the items Prices are to be based on the specific products/articles specified. If tenderers wish to offer alternative products/articles for certain items, these items are to be clearly marked and the alternative specification given with supporting brochures etc clarifying the features of the products/articles offered On request returnable samples are to be provided to the principal agent for consideration					
<u>Labour intensive methods</u>					
The contractor will be required to use labour intensive methods for the items which have been marked with the letters "LI" as described in the Scope of Work					
NOTE: All items in this section shall be deemed to fall into Work Group 132 for Haylett formula purposes					
HINGES, BOLTS, ETC					
A	WC indicator and turnknob for physically impaired (Stainless steel)	Sets	2.00	R	-
B	WC indicator and turnknob (Stainless steel)	Sets	5.00	R	-
CATCHES, CABIN HOOKS, ETC					
C	Hat and coat hook with rubber buffer (Stainless steel)	No	5.00	R	-
LOCKS					
A	50mm Brass padlock master key	No	1.00	R	-
B	66mm Five pin Euro-profile double cylinder grand master keyed (Satin Nickel)	No	4.00	R	-
C	66mm Euro-profile cylinder bathroom (Satin Nickel)	No	1.00	R	-
D	43mm Five pin Euro-profile single cylinder grand master keyed (Satin Nickel)	No	7.00	R	-
E	Stainless steel bathroom deadlock	No	5.00	R	-
F	Stainless steel cylinder deadlock	No	4.00	R	-
G	Master key	No	1.00	R	-
HANDLES					
H	325 x 25mm Stainless steel pull handle flange fixing	No	11.00	R	-
I	Pull handle BT fixed on a 300 x 150 x 1.2mm thick stainless steel plate with no cylinder cutout	No	6.00	R	-
J	Lever handle on plate with cylinder cutout (Satin Chrome)	Pairs	8.00	R	-
PUSH PLATES AND KICK PLATES					
<u>1.2mm Thick anodised aluminium plates countersunk screwed along edges at not exceeding 200mm centres</u>					
K	813 x 200mm Kick plate	No	15.00	R	-
L	300 x 150mm Stainless steel plate with cylinder cutout right	No	4.00	R	-
Total Carried Forward				R	-

Total Brought Forward			R	-
<u>DOOR CLOSERS</u>				
M	Parallel arm delayed action door closer with bracket fixed to metal	Sets	14.00	R -
N	Cam action slide channel non hold open door closer - hydraulic speed control	No	4.00	R -
<u>SUNDRIES</u>				
O	Nickel plated door stop, plugged	No	24.00	R -
<u>BATHROOM FITTINGS</u>				
A	153 x 153 x 65mm Deep stainless steel toilet roll holder, plugged	No	7.00	R -
B	115 x 270 x 110mm Deep stainless steel hand free soap dispenser, plugged	No	7.00	R -
C	350 x 365 x 230mm Deep stainless steel paper towel dispenser, plugged	No	7.00	R -
D	32mm stainless steel back grab rail 930mm long, plugged	No	2.00	R -
E	32mm stainless steel side grab rail 900mm girth, plugged	No	2.00	R -
<u>LETTERS, NAMEPLATES, ETC</u>				
F	100mm High anodised aluminium letter or numeral	No	20.00	R -
G	150 x 150mm Stainless steel plate with male or female symbol	No	2.00	R -
H	150 x 150mm Stainless steel plate with paraplegic symbol	No	2.00	R -
Total Carried to Summary			R	-

BILL NO. 12					
STRUCTURAL STEELWORK					
STANDARD PREAMBLES					
The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles					
<u>Descriptions</u>					
Descriptions of bolts shall be deemed to include nuts and washers					
Descriptions of L-shaped and U-shaped anchor bolts shall be deemed to include bending, threading, nuts and washers and embedding in concrete					
Descriptions of expansion anchors and bolts and chemical anchors and bolts shall be deemed to include nuts, washers and mortices in brickwork or concrete					
<u>Labour intensive methods</u>					
The contractor will be required to use labour intensive methods for the items which have been marked with the letters "LI" as described in the Scope of Work					
GALVANISED STEEL COLUMNS AND BEAMS					
<u>Welded columns in single lengths with flat base, cap, bearer and connection plates, bolted to concrete</u>					
A	100 x 100 x 3mm Square hollow - section columns	t			Rate Only
<u>Welded beams in single lengths with flat bearer and connection plates, bolted to steel</u>					
B	200 x 100mm x 22kg/m I-section beams	t			Rate Only
C	100 x 100 x 3mm Square hollow - section beams	t			Rate Only
<u>BOLTS, FASTENERS, ETC</u>					
D	High tensile bolts (class 8.8)	t	0.20		R -
Total Carried to Summary					R -

<u>BILL NO. 13</u>					
<u>METALWORK</u>					
<u>STANDARD PREAMBLES</u>					
The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles					
<u>SUPPLEMENTARY PREAMBLES</u>					
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					
Metalwork described as "holed for bolt(s)" shall be deemed to exclude the bolts unless otherwise described					
<u>Labour intensive methods</u>					
The contractor will be required to use labour intensive methods for the items which have been marked with the letters "L" as described in the Scope of Work					
NOTE: All items in this section shall be deemed to fall into Work Group 136 for Haylett formula purposes					
<u>GALVANISED STEEL HANDRAILS</u>					
<u>Welded handrails to balustrade and stair walls</u>					
A	76mm External diameter x 3mm thick pipe rails	m		Rate Only	
B	Extra over for rounded end	No	25.00	R	-
C	Extra over for ramp or knee	No	25.00	R	-
A	Bracket of 20mm diameter bar 40mm length, welded to 75mm internal radius and with one end welded to rail and other end with 90 x 100 x 10mm thick plate two holed for bolts and welded	No	15.00	R	-
<u>Mentis grating security ceilings</u>					
B	VEM 320J expanded metal mentis grating fixed between top side of rafter and underside of purlins with fixtures (nails or bolts)	m ²	2,411.00	R	-
<u>PRESSED STEEL DOOR FRAMES</u>					
<u>1.6mm Double rebated frames with three hinges suitable for half brick walls</u>					
C	Frame for door size 813 x 2032mm high	No	11.00	R	-
<u>1.6mm Double rebated frames with three hinges suitable for one brick walls</u>					
D	Frame for door size 813 x 2032mm high	No	11.00	R	-
<u>ALUMINIUM WINDOWS, DOORS, ETC</u>					
NOTE: All tenderers are referred to architects details and drawings based on these bills of quantities for tender purposes					
NOTE: Unless otherwise stated herein, all items in this bill shall be deemed to fall into Work Group No 149 for contract price adjustment purposes					
<u>Custom made Aluminium windows</u>					
E	Window 900 x 900mm high (Type W01)	No	6.00	R	-
F	Window 910 x 1510mm high (Type W02)	No	2.00	R	-
G	Window type 1360 x 1360mm high (Type W03)	No	11.00	R	-
H	Window 2500 x 1210mm high (Type W04)	No	2.00	R	-
I	Window 18000 x 1200mm high (Type W05)	No	3.00	R	-
Total Carried Forward				R	-

Total Brought Forward						R	-
	<u>Powder coated aluminium door complete with subframes, ironmongery, glass, sealing, etc and fixing to brickwork or concrete</u>						
A	Purpose made door, 5990 x 3532mm high Roller Shutter Door (D03)	No	6.00			R	-
	<u>Powder coated aluminium door complete with subframes, ironmongery, glass, sealing, etc and fixing to brickwork or concrete</u>						
B	Aluminium Door 810 x 2135mm high (D05)	No	15.00			R	-
C	Purpose made door, 1800 x 2135mm high Sliding Door (D06)	No	2.00			R	-
	<u>Powder coated aluminium shopfronts complete with subframes, ironmongery, glass, sealing, etc and fixing to brickwork or concrete</u>						
D	Purpose made shopfront, 3200 x 2125mm high with one double door 1500 x 2100mm high (D4)	No	15.00			R	-
<u>FENCING</u>							
E	"Cochrane ClearVu" or other equal approved high density anti-climbing and anti-cut mesh panel security fence 3.0m high formed of 3mm diameter horizontal and 4mm diameter vertical high tensile wires galvanised with alu-galv coating with aperture size 76.2 x 12.7mm and V-section ribs, bolted with vandal resistant bolts and clamping plates to 85-45mm taper locking post 1.80m high including locking recess mechanism at 3.38m centres with sealed end caps and 30 x 3 x 250mm long angle section base anchors with post bedded in 15Mpa concrete bases size 400 x 400 x 600mm deep	m	49.00			R	-
F	Ditto, Sliding gate size 6.65 x 3m high	No	2.00			R	-
G	Ditto, Sliding gate size 6.97 x 3m high	No	2.00			R	-
Total Carried to Summary						R	-

BILL NO. 14

PLASTERING

STANDARD PREAMBLES

The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles

SUPPLEMENTARY PREAMBLES

GRANOLITHIC

Method

The method to be used shall be either the monolithic method or the bonded method

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

Granolithic shall be laid in panels not exceeding 14m² for monolithic finishes, not exceeding 9,5m² for bonded finishes and not exceeding 6m² for all external granolithic. Wherever possible, panels shall be square but at no time should the length of the panel exceed 1,5 times its width

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

Colour

Coloured granolithic shall be tinted with an approved colouring pigment mixed into a true and even colour

<u>Labour intensive methods</u>					
The contractor will be required to use labour intensive methods for the items which have been marked with the letters "LI" as described in the Scope of Work					
NOTE: All items in this section shall be deemed to fall into Work Group 142 for Haylett formula purposes					
SCREEDS					
<u>8mm Thick Self Levelling Screeds applied in accordance with manufacturer's recommendations</u>					
A	On floors and landings (LI)	m ²	1,652.00	R	-
GRANOLITHIC					
<u>Polished granolithic, on concrete</u>					
A	60mm Thick on floors and slabs (LI)	m ²	576.00	R	-
B	60mm Thick on treads and risers of stairs (LI)	m ²	6.00	R	-
INTERNAL PLASTER					
<u>Cement plaster wood floated for tiles, on brickwork</u>					
C	On walls (LI)	m ²	986.00	R	-
D	On narrow widths (LI)	m ²	76.00	R	-
CORNER PROTECTORS, DIVIDING STRIPS, ETC					
E	15 x 10 x 1.6mm L-section brass dividing strips between differing floor finishes (LI)	m	91.00	R	-
EXTERNAL PLASTER					
<u>12mm thick cement plaster, steel trowelled, on brickwork</u>					
F	On walls (LI)	m ²	270.00	R	-
G	On narrow widths (LI)	m ²	78.00	R	-
Total Carried to Summary				R	-

BILL NO. 15					
TILING					
STANDARD PREAMBLES					
The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles					
SUPPLEMENTARY PREAMBLES					
Fixing					
Unless described as "fixed with adhesive to plaster (plaster 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 plaster bedding					
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 from approved range of products and as recommended by the manufacturer of the tiles					
<u>Labour intensive methods</u>					
The contractor will be required to use labour intensive methods for the items which have been marked with the letters "LI" as described in the Scope of Work					
NOTE: All items in this section shall be deemed to fall into Work Group 144 for Haylett formula purposes					
WALL TILING					
<u>330 x 330 x 8mm Glazed ceramic tiles (PC R 120.00/m²) fixed with adhesive to plaster (plaster elsewhere) and flush pointed with tinted grout</u>					
A	On walls (LI)	m ²	67.00	R	-
A	On narrow widths (LI)	m ²	33.00	R	-
B	Fair exposed cutting and fitting around pipe not exceeding 100mm internal diameter (LI)	No	14.00	R	-
FLOOR TILING					
<u>300 x 300 x 8mm Porcelain floor tiles (PC R 120.00/m²) fixed with adhesive to screed (screed elsewhere) and flush pointed with waterproof grout</u>					
C	On floors and landings (LI)	m ²	293.00	R	-
D	On narrow widths not exceeding 300mm wide (LI)	m ²	10.00	R	-
E	Skirting 100mm high of 330mm skirting tiles (LI)	m	52.00	R	-
SUNDRIES					
<u>Aluminium dividing strips</u>					
F	10 x 15mm Flat section dividing strips between tiles (LI)	m	35.00	R	-
Total Carried to Sumamry				R	-

BILL NO. 16

PLUMBING AND DRAINAGE

STANDARD PREAMBLES

The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles

SUPPLEMENTARY PREAMBLES

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-siphon 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

Lead pipes and traps

All soldered joints shall be wiped and brass unions shall be used for jointing lead to steel

Reducing fittings

Where fittings have reducing ends or branches they are described as "reducing". In the case of pipes with diameters not exceeding 60mm 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. In the case of pipes with diameters exceeding 60mm all sizes are given and no claim for extra bushes, reducers, etc will be entertained

Wire gratings

Descriptions of gutter outlets etc shall be deemed to include wire balloon gratings

Septic tanks

Descriptions of gutter outlets etc shall be deemed to include wire balloon gratings

Exposed concrete surfaces

Exposed surfaces of concrete stormwater channels, cover slabs, inspection eye marker slabs, gulley tops, cleaning eye tops, catchpits, inspection chambers, etc shall be finished smooth with plaster

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" 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 manufacturers' instructions

Where no manufacturers' instructions exist pipes shall be laid in accordance with clauses 5.1 and 5.2 of each of the following: SABS/SANS 1200 L : Medium-pressure pipelines LD : Sewers LE : Stormwater drainage Pipe trenches etc shall be backfilled in accordance with clauses 3, 5.5, 5.6, 5.7 and 7 of SABS/SANS 1200 DB : Earthworks (Pipe trenches) Pipes shall be bedded in accordance with clauses 3.1 to 3.4.1, 5.1 to 5.3 and 7 of SABS/SANS 1200 LB : Bedding (Pipes). Unless otherwise described bedding of rigid pipes shall be class B bedding

<u>Flush pans</u>					
Flush pans shall have straight or side outlets and "P" or "S" traps as necessary					
<u>Stainless steel basins, sinks, wash troughs, urinals, etc.</u>					
Units shall have standard aprons on all exposed edges and tiling keys against walls where applicable					
<u>Labour intensive methods</u>					
The contractor will be required to use labour intensive methods for the items which have been marked with the letters "L" as described in the Scope of Work					
NOTE: All items in this section shall be deemed to fall into Work Group 146 for Haylett formula purposes					
<u>RAINWATER DISPOSAL</u>					
<u>0,6mm Galvanised sheet steel gutters and rainwater pipes</u>					
A	150 x 100mm Roof gutters with beaded front edge	m	58.00	R	-
B	Extra over gutter for stopped end	No	8.00	R	-
C	Extra over gutter for angle	No	8.00	R	-
D	100 x 75mm Rainwater pipes	m	29.00	R	-
E	Extra over gutter for outlet for 100 x 75mm pipe	No	12.00	R	-
F	Extra over rainwater pipe for plinth bend	No	10.00	R	-
G	Extra over rainwater pipe for shoe	No	12.00	R	-
NOTE: All items in this section shall be deemed to fall into Work Group 148 for Haylett formula purposes					
<u>SANITARY FITTINGS</u>					
<u>Stainless steel single end bowl sink</u>					
H	1200 x 535mm Double bowl sink with 435 x 345mm centre end on cupboard (cupboard elsewhere)	No	1.00	R	-
<u>White glazed vitreous china</u>					
I	Low level WC suite with a 90 degree outlet washdown pan and, fitment and flush pipe (Flushmaster elsewhere measured)	No	5.00	R	-
J	Wall hung paraplegic WC pan with cradle bracket and legs and double flap white epoxy painted wooden seat (flush valve elsewhere)	No	2.00	R	-
K	510 x 405mm basin fixed on wall including brackets	No	7.00	R	-
<u>WASTE UNIONS ETC</u>					
L	32mm Basin waste union	No	6.00	R	-
M	32mm Bottle trap	No	6.00	R	-
A	38mm Bath or sink waste union	No	1.00	R	-
<u>TRAPS ETC</u>					
B	32 x 40mm Reseal "P" or "S" trap	No	14.00	R	-
C	40mm Reseal combination for double bowl with reseal "P" trap	No	5.00	R	-
<u>TAPS, VALVES, ETC</u>					
D	15mm CP sink mixer	No	1.00	R	-
E	15mm CP basin mixer	No	6.00	R	-
F	15mm 505-21CP elbow action pillar tap	No	6.00	R	-
G	15mm chromium plated angle regulating valve and flexible connection pipe	No	7.00	R	-
Total Carried Forward				R	-

Total Brought Forward				R	-
H	Junior flushmaster FJ6000 with flushpipe	No	6.00	R	-
I	FM2.100CP "Flushmaster" toilet flush valve	No	6.00	R	-
<u>SANITARY PLUMBING</u>					
<u>uPVC pipes</u>					
J	50mm pipe	m	259.00	R	-
K	110mm Pipes	m	123.00	R	-
L	110mm Pipes laid in and including trenches not exceeding 1m deep	m	123.00	R	-
<u>Extra over uPVC pipes for fittings</u>					
M	50mm Bend	No	82.00	R	-
N	50mm Junction	No	59.00	R	-
O	50mm Access bend	No	59.00	R	-
P	110mm Reducing junction	No	22.00	R	-
Q	110 x 50mm Reducing junction	No	11.00	R	-
R	110mm Double junction	No	11.00	R	-
A	110mm Bend	No	22.00	R	-
B	110mm Pan connector	No	11.00	R	-
C	110mm Access junction	No	6.00	R	-
D	110mm Access reducing junction	No	6.00	R	-
E	110mm Access double junction	No	6.00	R	-
F	110mm "GI Two-way" vent valve	No	6.00	R	-
<u>Sundries</u>					
G	Testing waste pipe system	Item	1.00	R	-
<u>WATER SUPPLIES</u>					
<u>Class 0 copper pipes</u>					
H	15mm Pipes	m	72.00	R	-
I	22mm Pipes	m	104.00	R	-
J	28mm Pipes	m	50.00	R	-
K	35mm Pipes	m	15.00	R	-
L	15mm Pipes chased in walls	m	86.00	R	-
M	22mm Pipes chased in walls	m	98.00	R	-
<u>Extra over class 0 copper pipes for capillary fittings</u>					
N	15mm Fittings	No	6.00	R	-
O	22mm Fittings	No	7.00	R	-
<u>Extra over class 0 copper pipes for brass compression fittings</u>					
P	15mm Fittings	No	7.00	R	-
Q	22mm Fittings	No	7.00	R	-
<u>ELECTRIC WATER GEYSERS</u>					
R	10 Litre Over-basin electric water heater	No	3.00	R	-
Total Carried to Summary				R	-

<u>BILL NO. 17</u> <u>GLAZING</u> <u>STANDARD PREAMBLES</u> The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles <u>SUPPLEMENTARY PREAMBLES</u> <u>Float glass</u> The term "float glass" is used for monolithic annealed glass <u>Laminated glass</u> Laminated glass to have polyvinyl butyral (PVB) interlayer(s) <u>Labour intensive methods</u> The contractor will be required to use labour intensive methods for the items which have been marked with the letters "LI" as described in the Scope of Work NOTE: All items in this section shall be deemed to fall into Work Group 150 for Haylett formula purposes <u>TOPS, SHELVES, DOORS, MIRRORS, ETC</u> <u>6mm Silvered float glass copper backed mirrors with polished edges, fixed with double sided adhesive tape and silicone</u>					
A	Mirror 450 x 600mm high	No	5.00	R	-
Total Carried to Summary				R	-

BILL NO. 18					
PAINTWORK					
STANDARD PREAMBLES					
The Tenderer is referred to the Building works GP ASC Rev 0 Model Preambles for Trades and to the Supplementary Preambles					
COLOURS					
Unless otherwise described all paintwork shall be deemed to have a colour value in excess of 7 on the Munsell system in accordance with SANS 1091					
<u>Labour intensive methods</u>					
The contractor will be required to use labour intensive methods for the items which have been marked with the letters "LI" as described in the Scope of Work					
NOTE: All items in this section shall be deemed to fall into Work Group 152 for Haylett formula purposes					
PAINTWORK ETC TO NEW WORK					
ON INTERNAL FLOATED PLASTER SURFACES					
<u>One coat alkali resistant primer and three coats superior quality acrylic emulsion paint for interior</u>					
A	Walls (LI)	m ²	986.00	R	-
ON FIBRE-CEMENT BOARD SURFACES					
<u>One coat alkali resistant primer and three coats PVA emulsion paint for exterior use</u>					
B	Ceilings and cornices, including priming metal cover strips and nailheads ("White" colour group) (LI)	m ²	334.00	R	-
C	Fascias and barge boards not exceeding 300mm girth, including priming metal jointing strips (LI)	m	140.00	R	-
ON PLASTERBOARD SURFACES					
<u>One coat alkali resistant primer and two coats PVA emulsion paint for interior use</u>					
A	On Partitions	m ²	758.00	R	-
ON METAL SURFACES					
<u>One coat alkyd based zinc phosphate primer and two coats premium quality polyurethane enamel paint, on steel</u>					
B	Gates, grilles, burglar screens, balustrades, etc (both sides measured over the full flat area) (LI)	m ²	33.00	R	-
C	Steel windows with glazing and burglar bars (measured on flat over both sides). (LI)	m ²	68.00	R	-
D	Eaves gutters (LI)	m ²	37.00	R	-
E	Rails, bars, pipes, etc not exceeding 300mm girth (LI)	m	29.00	R	-
ON WOOD SURFACES					
<u>One coat alkyd based primer and two coats premium quality polyurethane enamel paint, on steel</u>					
F	Door frames (LI)	m ²	66.00	R	-
G	Doors (LI)	m ²	91.00	R	-
H	Skirtings, rails, etc not exceeding 300mm girth (LI)	m	36.00	R	-
<u>Three coats superior quality clear gloss varnish</u>					
I	Doors (LI)	m ²	91.00	R	-
<u>Two coats polyurethane varnish</u>					
J	Bench (LI)	m ²	3.00	R	-
Total Carried to Summary				R	-

ITEM NO	DESCRIPTION		UNIT	QUANTITY	RATE	AMOUNT
	BILL NO. 19					
	PROVISIONAL SUMS					
	NOTES:					
	1. Where special attendance includes the provision of hoisting facilities for a Sub-Contractor then the Contractor shall:-					
	* Ensure that the capacities of his hoisting equipment are sufficient to deal with the masses and the quantities of the items to be hoisted,					
	* Schedule the times of availability of the hoisting equipment for each Sub-Contractor,					
	Provide all necessary personnel to operate the hoisting equipment,					
	all to enable the Sub-Contractor to execute the hoisting or lowering of his material, etc. using the facilities provided by the Contractor					
	2. Under no circumstances may any Provisional Amount, etc. be extended at an amount lower than the amount given in this Bill					
	The Contractor must read each description throughout this bills of quantities in conjunction with and in the context of the obligations, requirements and specifications stated in the descriptions, the Model Preambles for Trades (2008 Edition) and any supplementary Preambles to the Model Preambles forming part of these Bills of Quantities No claim arising from brevity of description of items fully described in the said Model Preambles for Trades or Supplementary Preambles to Model Preambles will be granted All provisional sums cover supply of material and equipment and installation. provisional sums are nett and do not include builder's discount (excluding settlement discount) and Value Added Tax but the Tenderer may allow under "Profit" items any profit he considers necessary					
	Mechanical Engineering					
A	Provide the amount of R 8330 000.00 (Eight Million. Three Hundred and Thirty Three Thousand Rand) for Mechanical Installation and Reticulation	Item		1.00	R	-
B	Profit	Item		1.00	R	-
C	Allow for general attendance	Item		1.00	R	-
	Rack Storage					
D	Provide the amount of R 2 500,000.00 (Two Million, Five Hundred Thousand Rand) for rack storage	Item		1.00	R	-
E	Profit	Item		1.00	R	-
F	Allow for general attendance	Item		1.00	R	-
	Occupational Health and Safety Compliance					
G	Provide the amount of R 150,000.00 (One Hundred and Fifty Thousand Rand) for OHS Compliance	Item		1.00	R	-
H	Profit	Item		1.00	R	-
I	Allow for general attendance	Item		1.00	R	-
	CLO					
J	Provide the amount of R 100,000.00 (One Hundred Thousand Rand) for CLO Salary	Item		1.00	R	-
K	Profit	Item		1.00	R	-
L	Allow for general attendance	Item		1.00	R	-

<u>BILL PREAMBLES & BILL OF QUANTITIES</u>	
	<u>GENERAL NOTES</u>
1	This Bill of Quantities forms part of, and must be read in conjunction with the specification
2	The quantities given in the Bill for cables, cable markers, earth wire laid with cables and excavations can not be regarded as exact and are subject to measurement on site after completion of the service and adjustment will be made according to the unit rates given in the bill. In the event of discrepancies between the drawings, specifications and Bill of Quantities, the Department shall decide whether the work as executed shall be remeasured on site or whether re-measurement shall be effected from the working drawings only. NOTE: <u>Checking of Cable Lengths</u> Notwithstanding the fact that the lengths of cables as given in the Bill of Quantities have been measured from scaled drawing, the contractor shall check such lengths on site before ordering the cable as he / she will not be paid for excess cable after the completion of the service. Any allowance for off-cuts shall be made in the unit rate. The final measurements shall be based on the nett route length of the cables concerned. <u>Checking of quantities for other materials</u> Notwithstanding the fact that the quantities for light fittings, switches, socket outlets and isolators as given in the Bill of Quantities have been from drawings, the contractor shall check such lengths and quantities on site before ordering the cable as he/she will not be paid for excess quantities after the completion of the service. Any ambiguous or dubious wording or quantities must be cleared with the responsible Engineer before work is stated. Wrong interpretation of the specification and / or drawings and Bill of Quantities, resulting in alterations and/or additional costs, is solely the responsibility of the contractor.
3	Where alternative prices for the switchgear of different manufacture are quoted the lowest alternative price for switchgear as per the specification must be quoted against the relevant item in the Bill of Quantities. The remaining alternative prices must be furnished separately.
4	The unit prices quoted in the Bill of Quantities must include for such small installation materials as are required for the complete installation in accordance with the specification.
5	All equipment, components and material shall be new, unused and best quality and shall comply with the relevant current specifications of the SABS, SANS and as stated in this document, wherever possible, be of South African manufacture.
6	No alteration, erasure or addition is to be made in the text of the Bill of Quantities. Should any alteration, erasure or addition to be made, it will not be recognised but the original wording of the Bill of Quantities will be adhered to.
7	The Engineer will check the completed Bill of Quantities and reserves the right to adjust any individual price and to rectify any discrepancy whilst the total tender price as quoted remains unaltered.
8	Electrical materials associated with the building, for example conduit accessories and wiring accessories, will not be re-measurable and the tenderer must therefore allow for the supply of all necessary accessories of materials for the successful execution and completion of the installation.
9	The unit rate for each item in the Bill of Quantities shall include for all materials, labour, profit, transport, etc., everything necessary for the execution and complete installation of the work in accordance with the description of the work.
10	The Bills of Quantities shall not be used for ordering purposes. The contractor shall check the lengths of cables, light fittings quantities, switches, socket outlets and isolators on site before ordering any of these materials. Any allowance for off-cuts of cables shall be made in the unit rates.
11	Samples of power skirting trunking, light fittings, switches, socket outlets and isolators shall be APPROVED by the Engineer before ordering any of these materials.
12	The rates shall exclude Value-Added Tax (VAT) and the total carried over to the final summary.
13	The contractor is required to label all distribution boards, supply and install all danger warning signs, label all switches, socket outlets and isolators etc. as per SANS requirements and all costs shall be deemed to have been provided for and included in the unit rate and sum amounts tendered for the items scheduled in the Bill of Quantities and separate additional payment will not be made.
14	Black ink shall be used for pricing the document, any other prices marked in other colours or pencil shall not be considered for the total price of the bill.

Item	Description	Unit	Qty	Rate	Amount
	BILL 1: RETICULATION AND DISTRIBUTION BOARDS				
	Distribution Boards				
	Distribution boards complete with all MCBs, switchgear, accessories, sheet metal frames, sub-frames, busbars, terminals, wiring, conduit terminations, labelling, fixtures and fittings as specified, with all equipment fitted and equipped in factory all strictly as per schematic diagram.				
	<i>(Please note that the distribution boards` shop drawings should be submitted to the Engineer for approval prior to manufacture).</i>				
	DB-MW				
	Supply	No.	1		
	Install	No.	1		
	DB-OW				
	Supply	No.	1		
	Install	No.	1		
	Low voltage cables				
	600/1 000V PVC/PVC/SWA/PVC, ECC type multi-core copper cable installed in sleeves (sleeves measured elsewhere)				
	150mm ² 4 Core (from Workshop to Main Warehouse, DB-MW)				
	Supply	m	60		
	Install	m	60		
	35mm ² 4 Core (from Workshop to Overflow Warehouse, DB-OW)				
	Supply	m	60		
	Install	m	60		
	Low voltage cable terminations (Glands & Shrouds)				
	Make off and terminate the LV cable, complete with glands and shrouds including connection of cable to equipment terminals				
	150mm ² 4 Core (No. 5)				
	Supply	No.	8		
	Install	No.	8		
	35mm ² 4 Core (No. 3)				
	Supply	No.	8		
	Install	No.	8		
	Low voltage cable terminations (Lugs)				
	Make off and terminate the LV cable, complete with glands and shrouds including connection of cable to equipment terminals				
	150mm ² x 10mm Hole Size				
	Supply	No.	8		
	Install	No.	8		
	35mm ² x 8mm Hole Size				
	Supply	No.	32		
	Install	No.	32		
	Earthing Conductors				
	Bare stranded copper earth conductor installed in sleeves (sleeves measured elsewhere)				
	95mm ²				
	Supply	m	150		
	Install	m	150		
	25mm ²				
	Supply	m	60		
	Install	m	60		
	Earthing conductor terminations				
	Make off and terminate earth conductor, including lugs and connections				
	95mm ² x 8mm Hole Size				
	Supply	No.	12		
	Install	No.	12		
	25mm ² x 8mm Hole Size				
	Supply	No.	16		
	Install	No.	16		
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Item	Description	Unit	Qty	Rate	Amount
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	Sleeves Kabefflex high density (or equal and approved) polyethylene (HDPE) sleeve with double wall construction, corrugated outer wall and smooth inner wall finish inclusive of couplers, bends, etc 110mm diameter Supply m 12 Install m 12 70mm diameter Supply m 100 Install m 100 Draw wires Draw wire drawn into sleeves and conduits including approximately 300mm slack in boxes, distribution board, etc. 1.6mm ² Galvanised steel draw wire Supply m 200 Install m 200 Excavations All excavations, back filling and compaction must be done manually using local labour Excavate for cable and sleeve trench including temporary support of sides, keeping excavations dry, backfilling and compacting to the Engineer's specification Pickable Soil m ³ 50 For Soft Rock m ³ 10 For Hard Rock m ³ 5 Bedding under and filling around cables comprising sifted sand Supply m ³ 60 Install m ³ 60 Cable Tape and Markers PVC warning marking tape Supply m 150 Install m 150 Concrete route markers Supply No. 10 Install No. 10 Testing and commissioning Testing and commissioning of the works covered within this bill. Item 1 Documentation Provision of the As-built drawings for the works covered within this bill showing all cable routes, conduit routes, etc Item 1 Provision of the Operation and Maintenance manuals for the works covered within this bill including conducting User's training Item 1 Provision of the Certificates of Compliance upon completion for the works covered within this bill. Item 1 Guarantee 12 month equipment and installation guarantee on the works covered within this bill. The guarantee period commences on the day of successful handing over of the building to the Client. Item 1				
	CARRIED FORWARD TO SUMMARY PAGE (ELECTRICAL)				

Item	Description	Unit	Qty	Rate	Amount
	<u>BILL 2: MAIN WAREHOUSE - ELECTRICAL INSTALLATIONS</u>				
	PVC conduits				
	PVC conduit including bending, short lengths, draw boxes, cutting,bands, jointing, couplings, saddles and accessories as per SABS 1065. Fixed to surface or laid in or flush mounted in brickwork, dry walls (partitions), concrete, roof space or ceiling void. The rate to allow for the conduit mounting brackets to suspend conduits from concrete slab as would be required in the ceiling void.				
	20mm	Supply	m	600	
		Install	m	600	
	25mm	Supply	m	600	
		Install	m	600	
	Galvanised Steel Conduits				
	Galvanised steel conduit including bending, short lengths, draw boxes, cutting,bands, jointing, couplings, saddles and accessories as per SABS 1065. Fixed to surface or laid in or flush mounted in brickwork, dry walls (partitions), concrete, roof space or ceiling void. The rate to allow for the conduit mounting brackets to suspend conduits from concrete slab as would be required in the ceiling void.				
	20mm	Supply	m	1000	
		Install	m	1000	
	25mm	Supply	m	2500	
		Install	m	2500	
	PVC round boxes				
	Surface or flush mounted 60mm deep PVC conduit round boxes with one, two, three or four way or back entry as required, including fixing to conduit with the necessary locknuts, adaptors, bushes, etc., installed in brickwork, on surface in ceiling void or cast in concrete inclusive of coverplates, where necessary.				
	20mm	Supply	No.	200	
		Install	No.	200	
	Galvanised round boxes				
	Surface or flush mounted 60mm deep galvanised conduit round boxes with one, two, three or four way or back entry as required, including fixing to conduit with the necessary locknuts, adaptors, bushes, etc., installed in brickwork, on surface in ceiling void or cast in concrete inclusive of coverplates, where necessary.				
	20mm	Supply	No.	280	
		Install	No.	280	
	Galvanised boxes				
	Surface or flush mounted galvanised boxes with one, two, three or four way or back entry as required, including fixing to conduit with the necessary locknuts, adaptors, bushes, etc., installed chased in brickwork, on surface in ceiling or cast in concrete, excluding coverplates.				
	100 x 50 x 50mm	Supply	No.	50	
		Install	No.	50	
	100 x 100 x 50mm	Supply	No.	100	
		Install	No.	100	
	Power skirting				
	Galvanised steel epoxy powder coated power skirting complete with separate straight cover plates				
	2-Compartment 2-Cover	Supply	m	130	
		Install	m	130	
	Power skirting Accessories				
	Galvanised steel epoxy powder coated power skirting accessories				
	2-Compartment 2-Cover Elbows	Supply	No.	20	
		Install	No.	20	
	2-Compartment 2-Cover End Caps	Supply	No.	20	
		Install	No.	20	
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Item	Description	Unit	Qty	Rate	Amount
	Brought forward from previous page				
	Power trunking Supply and install ceiling mounted single compartment galvanized steel trunking complete with covers, tees, bends, hangers, threaded rods, purlin clamps and all other accessories for a complete installation.				
	P2000 wiring channel c/w all installation accessories	Supply	m	510	
		Install	m	510	
	P9000 wiring channel c/w all installation accessories	Supply	m	140	
		Install	m	140	
	Horizontal Tee Bends				
	P2000 c/w all installation accessories	Supply	No	4	
		Install	No	4	
	P9000 c/w all installation accessories	Supply	No	4	
		Install	No	4	
	Horizontal Elbows				
	P2000 c/w all installation accessories	Supply	No	6	
		Install	No	6	
	P9000 c/w all installation accessories	Supply	No	6	
		Install	No	6	
	Vertical Elbows				
	P2000 c/w all installation accessories	Supply	No	6	
		Install	No	6	
	P9000 c/w all installation accessories	Supply	No	4	
		Install	No	4	
	PVC insulated conductors 600/1000V PVC insulated conductors drawn into conduit or installed in wiring channel including conductor identification labels, terminating, etc.				
	2.5 mm ²	Supply	m	6000	
		Install	m	6000	
	4.0 mm ²	Supply	m	4000	
		Install	m	4000	
	6.0 mm ²	Supply	m	800	
		Install	m	800	
	Insulated earth conductors Earth conductors drawn into conduit or installed in wiring channel including conductor identification labels, terminating, etc.				
	2.5 mm ²	Supply	m	2500	
		Install	m	2500	
	Bare copper earth conductors Earth conductors drawn into conduit or installed in wiring channel including conductor identification labels, terminating, etc.				
	2.5 mm ²	Supply	m	2500	
		Install	m	2500	
	4.0 mm ²	Supply	m	400	
		Install	m	400	
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Item	Description	Unit	Qty	Rate	Amount
	Brought forward from previous page				
	Socket outlets Socket outlet complete with all necessary chrome fixing screws, steel cover plates, labeling, cradles, including all holes, drilling, etc 16A, 230V, 3-pin single switched socket outlet, 2-pin slimline switched socket outlet, flush wall mounted complying to SANS 164-1 & SANS 164-2, Supply No. 12 Install No. 12 16A, 230V, 3-pin dedicated single switched socket outlet with shaved earth pin, 2-pin slimline socket outlet, wall mounted complying to SANS 164-1 & SANS 164-2. Supply No. 5 Install No. 5 16A, 230V, 3-pin single switched socket outlet, 2-pin slimline switched socket outlet, powerskirting trunking mounted complying to SANS 164-1 & SANS 164-2, Supply No. 40 Install No. 40 16A, 230V, 3-pin dedicated single switched socket outlet with shaved earth pin, 2-pin slimline socket outlet, powerskirting trunking mounted complying to SANS 164-1 & SANS 164-2. Supply No. 40 Install No. 40 Isolators Isolator complete with box, cover plate and accessories. 20A DP Single phase isolator, surface mounted IP65 Supply No. 15 Install No. 15 20A Double Pole Geyser isolator Supply No. 15 Install No. 15 60A Double Pole Stove isolator Supply No. 15 Install No. 15 Light switches Light switch complete with all necessary chrome fixing screws, steel cover plates, labeling, cradles, including all holes,drilling, etc inclusive of termination of circuit wiring onto switch terminals. 20A, 230V, 1 Lever 2 Way Supply No. 8 Install No. 8 Photocell Photocell installed in a suitably sized rectangular bulkhead luminaire housing with clear UV stabilised high impact acrylic lens and labelling as specified 20A, 230V, Photocell Supply No. 4 Install No. 4 Occupancy Sensors Ceiling/concrete slab mounted occupancy sensors for lighting control 20A, 250V, Passive 360° occupancy sensor Supply No. 8 Install No. 8 Light fittings SABS approved light fittings as per the specification, complete with lamps, machine or wood screws, bolts, installed and connected as specified. All fittings shall be similar or equal to (and subject to approval by the engineer) the light fittings specified in the schedule of light fittings. <i>Please note that all ceiling mounted light fittings shall be delivered with 3m of 1,5mm² flexible cabtyre with a 5 amp 3 pin plug top fitted.</i> Type A: 1 200mm long surface mounted open channel light fitting complete with 2x 23W, LED tubes, 2 150lumens per lamp, IP20 and electronic control gear. Supply No. 8 Install No. 8				
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Item	Description	Unit	Qty	Rate	Amount
	Brought forward from previous page				
	Type AE: 1 200mm long surface mounted open channel light fitting complete with 2x 23W, LED tubes, 2 150lumens per lamp, IP20, one hour emergency battery back-up and electronic control gear.				
	Supply	No.	10		
	Install	No.	10		
	Type B: 1 200mm long surface mounted watertight, steamproof and corrosion proof light fitting complete with 2x 23W, LED tubes, 2 150lumens per lamp, IP66 and electronic control gear.				
	Supply	No.	4		
	Install	No.	4		
	Type BE: 1 200mm long surface mounted watertight, steamproof and corrosion proof light fitting complete with 2x 23W, LED tubes, 2 150lumens per lamp, IP66, one hour emergency battery back-up and electronic control gear.				
	Supply	No.	4		
	Install	No.	4		
	Type C: Surface mounted bulkhead light fitting complete with die-cast LM6 aluminium powder coated housing, 4mm heat tampered safety front glass cover, 24W, LED lamp, 2 594 lumens, IP66, and electronic control gear.				
	Supply	No.	2		
	Install	No.	2		
	Type CE: Surface mounted bulkhead light fitting complete with die-cast LM6 aluminium powder coated housing, 4mm heat tampered safety front glass cover, 24W, LED lamp, 2 594 lumens, IP66, one hour emergency battery back-up and electronic control gear.				
	Supply	No.	10		
	Install	No.	10		
	Type D: Surface mounted functional floodlight fitting c/w die-cast LM6 aluminium powder coated housing, 4mm heat tampered safety front glass cover, 79W LED lamp, 14 247 lumens, IP66 and electronic control gear.				
	Supply	No.	12		
	Install	No.	12		
	Type H: High bay light fitting complete with 200W, LED lamp, 32 492lumens, IP67, 2m x 0.75mm ² 3Core Flex Cable, 5A Unswitched Socket Outlet, Plug Top and electronic control gear.				
	Supply	No.	25		
	Install	No.	25		
	Type HE: High bay light fitting complete with 200W, LED lamp, 32 492lumens, IP67, 2m x 0.75mm ² 3Core Flex Cable, 5A Unswitched Socket Outlet, Plug Top, one hour emergency battery back-up and electronic control gear.				
	Supply	No.	24		
	Install	No.	24		
	Earthing and lightning protection system installations				
	Allowance should be made for the following electrical equipment.				
	70mm ² PVC stranded copper conductor 600V/1000V grade drawn in conduit-down conductors shall be bonded to steel roof with M6 20mm long brass bolts, nuts and washers. Copper conductor shall be equipped with hexagon criped lig for bonding/termination.				
	70mm ² bare stranded copper conductor laid in trench for the creation of ring earth electrode in trench, 800mm below ground.				
	8mm diameter solid aluminium round conductor surface mounted on aluminium guides				
	Joint between dissimilar materials to be done by crimping lugs on the two types of materials and bond the lugs with M6 20mm long brass bolts, nuts and washers.				
	Earth electrodes to be extensible copper clad steel rods 12mm diameter and 1500mm long driven into the ground to a depth of not less than 600mm below finished ground level.				
	Bonding between stranded copper conductors and earth electrodes to be done by CAD weld method. Bonding to steel reinforcing to be done with a U clamp, the copper conductor to be equipped with a lug.				
	Test points to be created between down conductors and earth electrode conductors equipped with lugs and bonded with M6 20mm long brass bolts, nuts and washers.				
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Item	Description	Unit	Qty	Rate	Amount
	Brought forward from previous page				
	Site survey to be done prior to the installation and the soil resistivity shall be measured, the prevailing site conditions checked and a proposal submitted to the Engineer regarding the type of earthing.				
	Draw boxes, conduits equipped with draw wire placed in position for casting into concrete or screed, for building in or chased into concrete or brickwork and for surface mounted in ceiling voids including bending, threading, jointing, short lengths, draw boxes, couplings, bends, tees and saddles, etc. as specified.				
	Conduct soil resistivity tests and submit results	Item	1		
	32mm diameter PVC conduit built into brickwork/ installed in ground				
	Supply	m	80		
	Install	m	80		
	70mm ² PVC insulated copper down conductor				
	Supply	m	150		
	Install	m	150		
	70mm ² bare stranded copper conductor installed in ground				
	Supply	m	60		
	Install	m	60		
	Test points between down conductor and earth electrode conductor installed complete with lugs, bolts, nuts and washers as specified.				
	Supply	No.	11		
	Install	No.	11		
	Bonding of down conductors to roof sheetings installed complete with lugs, bolts, nuts and washers as specified.				
	Supply	No.	60		
	Install	No.	60		
	Bonding of earth electrode conductors to earth electrodes installed complete with CAD weld, lugs, bolts, nuts and washers as specified.				
	Supply	No.	11		
	Install	No.	11		
	12mm diameter 1500mm long extensible earth electrode complete installed 600mm below finished ground level				
	Supply	No.	11		
	Install	No.	11		
	25mm x 3mm copper tape				
	Supply	m	300		
	Install	m	300		
	8mm ² solid aluminium conductor				
	Supply	m	150		
	Install	m	150		
	Air discharge copper conductor				
	Supply	No.	11		
	Install	No.	11		
	Connection/test terminal on column inclusive of termination materials				
	Supply	No.	11		
	Install	No.	11		
	Allow for any other cost you may deem necessary to complete the installation of the lightning protection system.	Item	1		
	Testing and commissioning				
	Issue earth resistance test certificate	Sum	1		
	Testing and commissioning of the works covered within this bill.	Item	1		
	Documentation				
	Provision of the As-built drawings for the works covered within this bill showing all cable routes, conduit routes, etc	Item	1		
	Provision of the Operation and Maintenance manuals for the works covered within this bill including conducting User's training	Item	1		
	Provision of the Certificates of Compliance upon completion for the works covered within this bill.	Item	1		
	Guarantee				
	12 month equipment and installation guarantee on the works covered within this bill. The guarantee period commences on the day of successful handing over of the building to the Client.	Item	1		
	CARRIED FORWARD TO SUMMARY PAGE (ELECTRICAL)				

Item	Description	Unit	Qty	Rate	Amount
	<u>BILL 3: OVERFLOW WAREHOUSE - ELECTRICAL INSTALLATIONS</u>				
	PVC conduits				
	PVC conduit including bending, short lengths, draw boxes, cutting,bands, jointing, couplings, saddles and accessories as per SABS 1065. Fixed to surface or laid in or flush mounted in brickwork, dry walls (partitions), concrete, roof space or ceiling void. The rate to allow for the conduit mounting brackets to suspend conduits from concrete slab as would be required in the ceiling void.				
	20mm				
	Supply	m	500		
	Install	m	500		
	25mm				
	Supply	m	300		
	Install	m	300		
	Galvanised Steel Conduits				
	Galvanised steel conduit including bending, short lengths, draw boxes, cutting,bands, jointing, couplings, saddles and accessories as per SABS 1065. Fixed to surface or laid in or flush mounted in brickwork, dry walls (partitions), concrete, roof space or ceiling void. The rate to allow for the conduit mounting brackets to suspend conduits from concrete slab as would be required in the ceiling void.				
	20mm				
	Supply	m	800		
	Install	m	800		
	25mm				
	Supply	m	1200		
	Install	m	1200		
	PVC round boxes				
	Surface or flush mounted 60mm deep PVC conduit round boxes with one, two, three or four way or back entry as required, including fixing to conduit with the necessary locknuts, adaptors, bushes, etc., installed in brickwork, on surface in ceiling void or cast in concrete inclusive of coverplates, where necessary.				
	20mm				
	Supply	No.	72		
	Install	No.	72		
	Galvanised round boxes				
	Surface or flush mounted 60mm deep galvanised conduit round boxes with one, two, three or four way or back entry as required, including fixing to conduit with the necessary locknuts, adaptors, bushes, etc., installed in brickwork, on surface in ceiling void or cast in concrete inclusive of coverplates, where necessary.				
	20mm				
	Supply	No.	72		
	Install	No.	72		
	Galvanised boxes				
	Surface or flush mounted galvanised boxes with one, two, three or four way or back entry as required, including fixing to conduit with the necessary locknuts, adaptors, bushes, etc., installed chased in brickwork, on surface in ceiling or cast in concrete, excluding coverplates.				
	100 x 50 x 50mm				
	Supply	No.	10		
	Install	No.	10		
	100 x 100 x 50mm				
	Supply	No.	10		
	Install	No.	10		
	Power skirting				
	Galvanised steel epoxy powder coated power skirting complete with separate straight cover plates				
	2-Compartment 2-Cover				
	Supply	m	21		
	Install	m	21		
	Power skirting Accessories				
	Galvanised steel epoxy powder coated power skirting accessories				
	2-Compartment 2-Cover Elbows				
	Supply	No.	4		
	Install	No.	4		
	2-Compartment 2-Cover End Caps				
	Supply	No.	4		
	Install	No.	4		
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Item	Description	Unit	Qty	Rate	Amount
	Brought forward from previous page				
	Power trunking Supply and install ceiling mounted single compartment galvanized steel trunking complete with covers, tees, bends, hangers, threaded rods, purlin clamps and all other accessories for a complete installation. P2000 wiring channel c/w all installation accessories	Supply Install	m m	200 200	
	P9000 wiring channel c/w all installation accessories	Supply Install	m m	100 100	
	Horizontal Tee Bends P2000 c/w all installation accessories	Supply Install	No No	4 4	
	P9000 c/w all installation accessories	Supply Install	No No	4 4	
	Horizontal Elbows P2000 c/w all installation accessories	Supply Install	No No	6 6	
	P9000 c/w all installation accessories	Supply Install	No No	6 6	
	Vertical Elbows P2000 c/w all installation accessories	Supply Install	No No	6 6	
	P9000 c/w all installation accessories	Supply Install	No No	4 4	
	PVC insulated conductors 600/1000V PVC insulated conductors drawn into conduit or installed in wiring channel including conductor identification labels, terminating, etc. 2.5 mm ²	Supply Install	m m	2000 2000	
	4.0 mm ²	Supply Install	m m	1000 1000	
	6.0 mm ²	Supply Install	m m	400 400	
	Insulated earth conductors Earth conductors drawn into conduit or installed in wiring channel including conductor identification labels, terminating, etc. 2.5 mm ²	Supply Install	m m	1500 1500	
	Bare copper earth conductors Earth conductors drawn into conduit or installed in wiring channel including conductor identification labels, terminating, etc. 2.5 mm ²	Supply Install	m m	1500 1500	
	4.0 mm ²	Supply Install	m m	200 200	
	Carried forward to next page				

Item	Description	Unit	Qty	Rate	Amount
	Brought forward from previous page				
	Socket outlets Socket outlet complete with all necessary chrome fixing screws, steel cover plates, labeling, cradles, including all holes, drilling, etc 16A, 230V, 3-pin single switched socket outlet, 2-pin slimline switched socket outlet, flush wall mounted complying to SANS 164-1 & SANS 164-2, Supply No. 8 Install No. 8 16A, 230V, 3-pin dedicated single switched socket outlet with shaved earth pin, 2-pin slimline socket outlet, wall mounted complying to SANS 164-1 & SANS 164-2. Supply No. 4 Install No. 4 16A, 230V, 3-pin single switched socket outlet, 2-pin slimline switched socket outlet, powerskirting trunking mounted complying to SANS 164-1 & SANS 164-2, Supply No. 8 Install No. 8 16A, 230V, 3-pin dedicated single switched socket outlet with shaved earth pin, 2-pin slimline socket outlet, powerskirting trunking mounted complying to SANS 164-1 & SANS 164-2. Supply No. 8 Install No. 8 Isolators Isolator complete with box, cover plate and accessories. 20A DP Single phase isolator, surface mounted IP65 Supply No. 8 Install No. 8 Light switches Light switch complete with all necessary chrome fixing screws, steel cover plates, labeling, cradles, including all holes,drilling, etc inclusive of termination of circuit wiring onto switch terminals. 20A, 230V, 1 Lever 2 Way Supply No. 4 Install No. 4 Photocell Photocell installed in a suitably sized rectangular bulkhead luminaire housing with clear UV stabilised high impact acrylic lens and labelling as specified 20A, 230V, Photocell Supply No. 2 Install No. 2 Occupancy Sensors Ceiling/concrete slab mounted occupancy sensors for lighting control 20A, 250V, Passive 360° occupancy sensor Supply No. 4 Install No. 4 Light fittings SABS approved light fittings as per the specification, complete with lamps, machine or wood screws, bolts, installed and connected as specified. All fittings shall be similar or equal to (and subject to approval by the engineer) the light fittings specified in the schedule of light fittings. <i>Please note that all ceiling mounted light fittings shall be delivered with 3m of 1,5mm² flexible cabtyre with a 5 amp 3 pin plug top fitted.</i> Type D: Surface mounted functional floodlight fitting c/w die-cast LM6 aluminium powder coated housing, 4mm heat tampered safety front glass cover, 79W LED lamp, 14 247 lumens, IP66 and electronic control gear. Supply No. 6 Install No. 6 Type H: High bay light fitting complete with 200W, LED lamp, 32 492lumens, IP67, 2m x 0.75mm² 3Core Flex Cable, 5A Unswitched Socket Outlet, Plug Top and electronic control gear. Supply No. 9 Install No. 9				
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Item	Description	Unit	Qty	Rate	Amount
	Brought forward from previous page				
	Type HE: High bay light fitting complete with 200W, LED lamp, 32 492lumens, IP67, 2m x 0.75mm ² 3Core Flex Cable, 5A Unswitched Socket Outlet, Plug Top, one hour emergency battery back-up and electronic control gear.				
	Supply	No.	9		
	Install	No.	9		
	Earthing and lightning protection system installations				
	Allowance should be made for the following electrical equipment.				
	70mm ² PVC stranded copper conductor 600V/1000V grade drawn in conduit-down conductors shall be bonded to steel roof with M6 20mm long brass bolts, nuts and washers. Copper conductor shall be equipped with hexagon crimped lig for bonding/termination.				
	70mm ² bare stranded copper conductor laid in trench for the creation of ring earth electrode in trench, 800mm below ground.				
	8mm diameter solid aluminium round conductor surface mounted on aluminium guides				
	Joint between dissimilar materials to be done by crimping lugs on the two types of materials and bond the lugs with M6 20mm long brass bolts, nuts and washers.				
	Earth electrodes to be extensible copper clad steel rods 12mm diameter and 1500mm long driven into the ground to a depth of not less than 600mm below finished ground level.				
	Bonding between stranded copper conductors and earth electrodes to be done by CAD weld method. Bonding to steel reinforcing to be done with a U clamp, the copper conductor to be equipped with a lug.				
	Test points to be created between down conductors and earth electrode conductors equipped with lugs and bonded with M6 20mm long brass bolts, nuts and washers.				
	Site survey to be done prior to the installation and the soil resistivity shall be measured, the prevailing site conditions checked and a proposal submitted to the Engineer regarding the type of earthing.				
	Draw boxes, conduits equipped with draw wire placed in position for casting into concrete or screed, for building in or chased into concrete or brickwork and for surface mounted in ceiling voids including bending, threading, jointng, short lengths, draw boxes, couplings, bends, tees and saddles, etc. as specified.				
	Conduct soil resistivity tests and submit results	Item	1		
	32mm diameter PVC conduit built into brickwork/ installed in ground				
	Supply	m	160		
	Install	m	160		
	70mm ² PVC insulated copper down conductor				
	Supply	m	160		
	Install	m	160		
	70mm ² bare stranded copper conductor installed in ground				
	Supply	m	40		
	Install	m	40		
	Test points between down conductor and earth electrode conductor installed complete with lugs, bolts, nuts and washers as specified.				
	Supply	No.	12		
	Install	No.	12		
	Bonding of down conductors to roof sheetings installed complete with lugs, bolts, nuts and washers as specified.				
	Supply	No.	12		
	Install	No.	12		
	Bonding of earth electrode conductors to earth electrodes installed complete with CAD weld, lugs, bolts, nuts and washers as specified.				
	Supply	No.	12		
	Install	No.	12		
	12mm diameter 1500mm long extensible earth electrode complete installed 600mm below finished ground level				
	Supply	No.	12		
	Install	No.	12		
	Carried forward to next page				

Item	Description	Unit	Qty	Rate	Amount
	Brought forward from previous page				
	25mm x 3mm copper tape	Supply Install	m m	160 160	
	8mm² solid aluminium conductor	Supply Install	m m	160 160	
	Air discharge copper conductor	Supply Install	No. No.	12 12	
	Connection/test terminal on column inclusive of termination materials	Supply Install	No. No.	12 12	
	Allow for any other cost you may deem necessary to complete the installation of the lightning protection system.	Item	1		
	Testing and commissioning				
	Issue earth resistance test certificate	Sum	1		
	Testing and commissioning of the works covered within this bill.	Item	1		
	Documentation				
	Provision of the As-built drawings for the works covered within this bill showing all cable routes, conduit routes, etc	Item	1		
	Provision of the Operation and Maintenance manuals for the works covered within this bill including conducting User's training	Item	1		
	Provision of the Certificates of Compliance upon completion for the works covered within this bill.	Item	1		
	Guarantee				
	12 month equipment and installation guarantee on the works covered within this bill. The guarantee period commences on the day of successful handing over of the building to the Client.	Item	1		
	CARRIED FORWARD TO SUMMARY PAGE (ELECTRICAL)				

Item	Description	Unit	Qty	Rate	Amount
	BILL 4: WORKSHOP OFFICES - ELECTRICAL INSTALLATIONS				
	PVC conduits				
	PVC conduit including bending, short lengths, draw boxes, cutting,bands, jointing, couplings, saddles and accessories as per SABS 1065. Fixed to surface or laid in or flush mounted in brickwork, dry walls (partitions), concrete, roof space or ceiling void. The rate to allow for the conduit mounting brackets to suspend conduits from concrete slab as would be required in the ceiling void.				
	20mm	Supply	m	400	
		Install	m	400	
	25mm	Supply	m	300	
		Install	m	300	
	Galvanised Steel Conduits				
	Galvanised steel conduit including bending, short lengths, draw boxes, cutting,bands, jointing, couplings, saddles and accessories as per SABS 1065. Fixed to surface or laid in or flush mounted in brickwork, dry walls (partitions), concrete, roof space or ceiling void. The rate to allow for the conduit mounting brackets to suspend conduits from concrete slab as would be required in the ceiling void.				
	20mm	Supply	m	400	
		Install	m	400	
	25mm	Supply	m	300	
		Install	m	300	
	PVC round boxes				
	Surface or flush mounted 60mm deep PVC conduit round boxes with one, two, three or four way or back entry as required, including fixing to conduit with the necessary locknuts, adaptors, bushes, etc., installed in brickwork, on surface in ceiling void or cast in concrete inclusive of coverplates, where necessary.				
	20mm	Supply	No.	100	
		Install	No.	100	
	Galvanised round boxes				
	Surface or flush mounted 60mm deep galvanised conduit round boxes with one, two, three or four way or back entry as required, including fixing to conduit with the necessary locknuts, adaptors, bushes, etc., installed in brickwork, on surface in ceiling void or cast in concrete inclusive of coverplates, where necessary.				
	20mm	Supply	No.	400	
		Install	No.	400	
	Galvanised boxes				
	Surface or flush mounted galvanised boxes with one, two, three or four way or back entry as required, including fixing to conduit with the necessary locknuts, adaptors, bushes, etc., installed chased in brickwork, on surface in ceiling or cast in concrete, excluding coverplates.				
	100 x 50 x 50mm	Supply	No.	10	
		Install	No.	10	
	100 x 100 x 50mm	Supply	No.	10	
		Install	No.	10	
	Power skirting				
	Galvanised steel epoxy powder coated power skirting complete with separate straight cover plates				
	2-Compartment 2-Cover	Supply	m	21	
		Install	m	21	
	Power skirting Accessories				
	Galvanised steel epoxy powder coated power skirting accessories				
	2-Compartment 2-Cover Elbows	Supply	No.	8	
		Install	No.	8	
	2-Compartment 2-Cover End Caps	Supply	No.	12	
		Install	No.	12	
	Carried forward to next page				

Item	Description	Unit	Qty	Rate	Amount
	Brought forward from previous page				
	Power trunking Supply and install ceiling mounted single compartment galvanized steel trunking complete with covers, tees, bends, hangers, threaded rods, purlin clamps and all other accessories for a complete installation. P9000 wiring channel c/w all installation accessories	Supply m Install m	100 100		
	Horizontal Tee Bends P9000 c/w all installation accessories	Supply No Install No	4 4		
	Horizontal Elbows P9000 c/w all installation accessories	Supply No Install No	6 6		
	Vertical Elbows P9000 c/w all installation accessories	Supply No Install No	4 4		
	PVC insulated conductors 600/1000V PVC insulated conductors drawn into conduit or installed in wiring channel including conductor identification labels, terminating, etc. 2.5 mm ²	Supply m Install m	2000 2000		
	4.0 mm ²	Supply m Install m	1000 1000		
	6.0 mm ²	Supply m Install m	200 200		
	Insulated earth conductors Earth conductors drawn into conduit or installed in wiring channel including conductor identification labels, terminating, etc. 2.5 mm ²	Supply m Install m	1500 1500		
	Bare copper earth conductors Earth conductors drawn into conduit or installed in wiring channel including conductor identification labels, terminating, etc. 2.5 mm ²	Supply m Install m	1500 1500		
	4.0 mm ²	Supply m Install m	100 100		
	Socket outlets Socket outlet complete with all necessary chrome fixing screws, steel cover plates, labeling, cradles, including all holes, drilling, etc 16A, 230V, 3-pin single switched socket outlet, 2-pin slimline switched socket outlet, flush wall mounted complying to SANS 164-1 & SANS 164-2,	Supply No. Install No.	8 8		
	16A, 230V, 3-pin dedicated single switched socket outlet with shaved earth pin, 2-pin slimline socket outlet, wall mounted complying to SANS 164-1 & SANS 164-2.	Supply No. Install No.	4 4		
	16A, 230V, 3-pin single switched socket outlet, 2-pin slimline switched socket outlet, powerskirting trunking mounted complying to SANS 164-1 & SANS 164-2,	Supply No. Install No.	16 16		
	Carried forward to next page				

Item	Description	Unit	Qty	Rate	Amount
	Brought forward from previous page				
	16A, 230V, 3-pin dedicated single switched socket outlet with shaved earth pin, 2-pin slimline socket outlet, powerskirting trunking mounted complying to SANS 164-1 & SANS 164-2.				
	Supply	No.	16		
	Install	No.	16		
	Isolators				
	Isolator complete with box, cover plate and accessories.				
	20A DP Single phase isolator, surface mounted IP65				
	Supply	No.	8		
	Install	No.	8		
	Light switches				
	Light switch complete with all necessary chrome fixing screws, steel cover plates, labeling, cradles, including all holes, drilling, etc inclusive of termination of circuit wiring onto switch terminals.				
	20A, 230V, 1 Lever 2 Way				
	Supply	No.	4		
	Install	No.	4		
	Photocell				
	Photocell installed in a suitably sized rectangular bulkhead luminaire housing with clear UV stabilised high impact acrylic lens and labelling as specified				
	20A, 230V, Photocell				
	Supply	No.	1		
	Install	No.	1		
	Occupancy Sensors				
	Ceiling/concrete slab mounted occupancy sensors for lighting control				
	20A, 250V, Passive 360° occupancy sensor				
	Supply	No.	4		
	Install	No.	4		
	Light fittings				
	SABS approved light fittings as per the specification, complete with lamps, machine or wood screws, bolts, installed and connected as specified. All fittings shall be similar or equal to (and subject to approval by the engineer) the light fittings specified in the schedule of light fittings.				
	<i>Please note that all ceiling mounted light fittings shall be delivered with 3m of 1,5mm² flexible cable with a 5 amp 3 pin plug top fitted.</i>				
	Type A: 1 200mm long surface mounted open channel light fitting complete with 2x 23W, LED tubes, 2 150lumens per lamp, IP20 and electronic control gear.				
	Supply	No.	6		
	Install	No.	6		
	Type AE: 1 200mm long surface mounted open channel light fitting complete with 2x 23W, LED tubes, 2 150lumens per lamp, IP20, one hour emergency battery back-up and electronic control gear.				
	Supply	No.	7		
	Install	No.	7		
	Testing and commissioning				
	Issue earth resistance test certificate	Sum	1		
	Testing and commissioning of the works covered within this bill.	Item	1		
	Documentation				
	Provision of the As-built drawings for the works covered within this bill showing all cable routes, conduit routes, etc	Item	1		
	Provision of the Operation and Maintenance manuals for the works covered within this bill including conducting User's training	Item	1		
	Provision of the Certificates of Compliance upon completion for the works covered within this bill.	Item	1		
	Guarantee				
	12 month equipment and installation guarantee on the works covered within this bill. The guarantee period commences on the day of successful handing over of the building to the Client.	Item	1		
	CARRIED FORWARD TO SUMMARY PAGE (ELECTRICAL)				

Item	Description	Unit	Qty	Rate	Amount
	BILL 5: STANDBY GENERATOR SYSTEM				
	Supply and install a new 110 kVA, 380V, 50Hz weatherproof standby generator c/w auacoustic canopy and Automatic Mains Failure Panel (AMF).	No.	1		
	Supply Install	No. No.	 1		
	Reserve fuel tank				
	Supply and install a new 1 000 litre reserve fuel tank complete with a manual pump and 10m hose pipe.	Item	1		
	Testing and commissioning				
	Testing and commissioning of the generator covered within the contract	Item	1		
	Documentation				
	Provision of the As-built drawings for the generator covered within the contract.	Item	1		
	Provision of the Operation and Maintenance manuals for the generator covered within the contract including conducting User's training	Item	1		
	Provision of the Certificates of Compliance upon completion for the generator covered within the contract	Item	1		
	Guarantee				
	12 month equipment and installation guarantee on the generator covered within the contract.The guarantee period commences on the day of successful handing over of the building to the Client.	Item	1		
	CARRIED FORWARD TO SUMMARY PAGE (ELECTRICAL)				

Item	Description	Unit	Qty	Rate	Amount
	BILL 6: UNINTERRUPTIBLE POWER SUPPLY SYSTEM (UPS) Supply and install a new 20 kVA, 380V, 50Hz uninterruptible power supply system (UPS) complete 15minutes back-up time. Supply Install	No. No.	1 1		
	Testing and commissioning Testing and commissioning of the generator covered within the contract	Item	1		
	Documentation Provision of the Operation and Maintenance manuals for the generator covered within the contract including conducting User's training	Item	1		
	Guarantee 12 month equipment and installation guarantee on the generator covered within the contract.The guarantee period commences on the day of successful handing over of the building to the Client.	Item	1		
	CARRIED FORWARD TO SUMMARY PAGE (ELECTRICAL)				

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL
	BILL No. 7: 10G FIBRE OPTIC BACKBONE NETWORK NOTE: The complete installation must comply with the electrical installation specifications. Therefore Tenders are advised to study the specifications and drawings before pricing the Bill. Installation of a10G fibre optic network to provide the backbone for CCTV, Data and IP Telephony Systems. The 2 x Core switches come with 10G Connections for Stacking, Uplink to Servers and Network Storage Systems. Multiple VLANS are to be deployed. Spanning Tree Protocol (Per VLAN) must be configured to ensure a loop-free network. Root Bridge Functionality must be shared between the two Layer three core switches and load balanced based on VLANS. The network must be segmented using VLANS. The Layer 3 switches will provide any inter VLAN routing if required. All user ports must be configured as Access Ports with Port Security enabled. Only one fixed Mac address must be allowed per access port. Logs & alerts to be generated for any security violation. All unused access ports must be shut down. Switches must be configured to mitigate against all known kinds of network & TCP/IP suite attacks. Bandwidth optimization through the use and configuration of IGMP (Querier / Snooper) on all the switches. All switches are 1U, 19" and PoE - IEEE 802.3af / 802.3at, switch Multimode fibre, 4 core, OM4 Supply m 1500 Install m 1500 XFP, SFP+ Modules, 10G Transceivers Supply No 12 Install No 12 24U Rack Mount, Fibre Optic Sliding Patch Panel / splice box Supply No 1 Install No 1 Multimode Duplex OM4 Fiber Optic Patch Cable (50/125) - 1m - LC to Supply No 24 Install No 24 Fibre splicing Supply No 48 Install No 48 Stackable, Managed, Multilayer Switch. 12 x 10GBASE-X SFP+ ports, 4 x 10GBASE-T Copper Ethernet connections. Dual redundant, modular power supplies and fans • MACsec hardware-based encryption • Switch-to-switch hardware encryption • IPv4 & IPv6, multicast routing, advanced quality of service (QoS), and security features in hardware • Spanning Tree Protocols: 802.1d/w/s (RSTP, MSTP and Rapid PVST+; IGMP Snooping: v1/v2/v3; PIM; VLANs - Port-based; Port Security; SSL/HTTP; SSH/Secure Shell ; RADIUS/ TACACS+ Client; - rack-mountable,PoE - IEEE 802.3af. Supply No 1 Install No 1				
	Total Carried Forward				

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL
	Total Brought Forward				
	Managed switch, Layer 2 GigE - 48 x 10/100/1000 + 4 x 10 Gigabit SFP+; Dual redundant, modular power supplies and fans • MACsec hardware-based encryption • Switch-to-switch hardware encryption • IPv4 & IPv6, multicast routing, advanced quality of service (QoS), and security features in hardware • Spanning Tree Protocols: 802.1d/w/s (RSTP, MSTP and Rapid PVST+; IGMP Snooping: v1/v2/v3; PIM; VLANs - Port-based; Port Security; SSL/HTTP; SSH/Secure Shell ; RADIUS/ TACACS+ Client; - rack-mountable, PoE - IEEE 802.3af. Supply No 1 Install No 1 Managed switch, Layer 2 GigE - 48 x 10/100/1000 + 2 x 10 Gigabit SFP+; Dual redundant, modular power supplies and fans • MACsec hardware-based encryption • Switch-to-switch hardware encryption • IPv4 & IPv6, multicast routing, advanced quality of service (QoS), and security features in hardware • Spanning Tree Protocols: 802.1d/w/s (RSTP, MSTP and Rapid PVST+; IGMP Snooping: v1/v2/v3; PIM; VLANs - Port-based; Port Security; SSL/HTTP; SSH/Secure Shell ; RADIUS/ TACACS+ Client; - rack-mountable, PoE - IEEE 802.3af; [1NO installed plus ONO spare] Supply No 1 Install No 1 43U 19inch cabinet, integrated rack, incl cooling fans, rack shelves, rack rails. Rack must also come with a 230V, 16A, 3pin round (X 10 socket) outlets adapter, white in colour, suitable for mounting on the 19" rack Supply No 1 Install No 1 3kVA 3phase UPS system with 30 minutes autonomy: Supply No 1 Install No 1 800VA inline, rack mount, UPS system with 30 minutes autonomy: Supply No 1 Install No 1 Testing and Commissioning Testing, Commissioning of Installation and supply of OTDR results No 1 Manuals, Documentation, AS Builts No 3				
	CARRIED FORWARD TO SUMMARY PAGE (ELECTRICAL)				

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL
NOTE:	BILL No. 8 - CCTV SURVEILLANCE AND DIGITAL RECORDING SYSTEM				
	The complete installation must comply with the electrical installation specifications. Therefore Tenders are advised to study the specifications and drawings before pricing the Bill.				
	32-Channel DVR				
	Record from and manage up to 60 cameras with the M series 60-channel 8K NVR (No HDD). This NVR supports IP cameras up to 32MP equipped with fifteen SATA ports that each support an HDD up to 14TB for a maximum capacity of 112TB (HDDs available seperately). H.265+, H.265.				
	Supply	No	1		
	Install	No	1		
	HARD-DRIVE				
	14 Terrabyte hard-drive with two months storage				
	Supply	No	2		
	Install	No	2		
	POE				
	24 port Gigabit Smart PoE switch				
	Supply	No	3		
	Install	No	3		
	CAT6 UTP				
	C64PB: CAT6 UTP, 4pair Cable				
	Supply	m	4000		
	Install	m	4000		
	RJ45 Boots				
	Supply	No	200		
	Install	No	200		
	Brush Panel				
	19-inch rack mount brush panel BRUSHPANEL-1U				
	Supply	No	8		
	Install	No	8		
	Flylead				
	UltraLAN 1m CAT6 Flylead - Blue				
	Supply	No	62		
	Install	No	62		
	Patch Panel				
	48-port RJ45 Patch Panel 2U PP-1U48P				
	Supply	No	2		
	Install	No	2		
	Galvanised Steel Conduits				
	Galvanised steel conduit including bending, short lengths, draw boxes, cutting,bands, jointing, couplings, saddles and accessories as per SABS 1065. Fixed to surface or laid in or flush mounted in brickwork, dry walls (partitions), concrete, roof space or ceiling void. The rate to allow for the conduit mounting brackets to suspend conduits from concrete slab as would be required in the ceiling void.				
	25mm				
	Supply	m	3000		
	Install	m	3000		
	Rackmount UPS				
	RCT 3000VA/2400W online rackmount UPS 3000-WPRU				
	Supply	No	2		
	Install	No	2		
	Junction Box for Cameras				
	Indoor and outdoor junction boxes, load capacity 4.5kg weatherproof				
	Supply	No	60		
	Install	No	60		
Total Carried Forward					

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL
	Total Brought Forward				
	2MP Varifocal Bullet Network Cameras 2MP 2.8-12mm AcuSense Motorised varifocal bullet network cameras (2.8-12mm) Supply No 30 Install No 30 2MP Varifocal Dome Cameras AcuSense 2MP 2.8-12mm motorised varifocal dome network cameras powered by DarkFighter Audio, Environment noise, filtering Yes, Audio sampling rate 8kHz/16kHz/32kHz/44.1kHz/48kHz Supply No 30 Install No 30 ANPR Motorised Varifocal Bullet Camera 4MP 2.8-12mm DeepinView ANPR Motorised varifocal bullet cameras powered by Darkfighter at security guard house, license plate recognition rate. Supply No 2 Install No 2 Testing and Commissioning Testing and Commissioning of Installation No 1 Manuals, Documentation, AS Builts No 3 Training of Personnel No 2				
	CARRIED FORWARD TO SUMMARY PAGE (ELECTRICAL)				

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL
NOTE:	BILL No. 9: DATA NETWORK: WIRELESS AND WIRED				
	The complete installation must comply with the electrical installation specifications. Therefore Tenders are advised to study the specifications and drawings before pricing the Bill.				
	Installation of wired data points and wireless access points as specified and as indicated on drawings. Separate VLANs for wired data and wireless data must be configured. The system runs on the 10G Fibre LAN				
	CAT6a UTP Cable (Colour: Grey)				
	Supply	m	2200		
	Install	m	2200		
	CAT 6a UTP Fly Leads, 2m (Grey)				
	Supply	No	24		
	Install	No	24		
	105 Wired data points & 40 points for WAP, as specified and as indicated on drawings. (Inclusive of boxes, RJ45 faceplates & Cat 6 termination)				
	Supply	No	24		
	Install	No	24		
	Indoor Wireless Access Point Device. Features: 802.11ac MU-MIMO technology, 802.11i, WPA2, WPA, 802.1X, AES, PoE				
	Supply	No	10		
	Install	No	10		
	Wireless LAN Controller with 50 AP License. Wireless intrusion prevention system (IPS) capabilities, RF management, QoS, and Layer 3 fast secure roaming. 2 x 10 GigE support, PoE				
	Supply	No	1		
	Install	No	1		
	Authentication Server, hardware, operational software & server licence				
	Supply	No	1		
	Install	No	1		
	Testing and Commissioning				
	Testing and Commissioning of Installation				
		No	1		
	Manuals, Documentation, AS Builts				
		No	3		
CARRIED FORWARD TO SUMMARY PAGE (ELECTRICAL)					

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL
NOTE:	BILL No. 10: IP TELEPHONE SYSTEM				
	The complete installation must comply with the electrical installation specifications. Therefore Tenders are advised to study the specifications and drawings before pricing the Bill.				
	Installation of an Open Source VoIP Server System. The system must have a built in, non-proprietary codec which provides good sound quality and low bandwidth usage. The IP-PBX must have a Gateway Feature to support Telkom lines. In the event of the IP-PBX going off or faulty, the Telkom lines must automatically be switched and extended to the Principal or vice-Principal and reception phones. When the IP-PBX is back up, normalisation must also be automatic. All the phones must support the non-proprietary Session Initiation Protocol (SIP), call manager. The Telephones are to be configured in their own VLAN or Voice VLAN. The system runs on the 10G ICT Fibre LAN				
	Modular Voice over IP Gateway - VoIP phone adapter. Authentication Method - RADIUS, TACACS+ , GiE, DHCP, DNS, HSRP, CLI, HTTP, SNMP 3, TFTP, Telnet. Voip Protocols - H.323 v4, MGCP, RTP, SCCP, SIP, SRTP. Voice Codecs - G.711, G.729a, T.38. IP Telephony features - automatic fax/modem detection and pass-through, call hold, call transfer, call waiting, caller ID. Rack Mount, 1U. The system must be able to support at least 4 Telkom lines, IP Trunk Ports and up to 20 extensions.				
	Supply	No	1		
	Install	No	1		
	CAT6a UTP Cable ((Colour: Green)				
	Supply	m	1800		
	Install	m	1800		
	SIP Compatible VoIP Telephone handsets.				
	Supply	No	14		
	Install	No	14		
	Telephone Console				
	Supply	No	1		
	Install	No	1		
	Telephone Management System				
	Supply	No	1		
	Install	No	1		
	Main Telephone DB				
	Supply	No	1		
	Install	No	1		
	Outdoor Telephone Supporting Structure				
	Supply	No	1		
	Install	No	1		
	Line Lightning Arresters and Earthing				
	Supply	No	2		
	Install	No	2		
	Telephone data points on power skirting or wall mounted as specified and as indicated on drawings.(Inclusive of boxes, RJ45 faceplates, Cat 6 cable termination)				
	Supply	No	14		
	Install	No	14		
	Testing and Commissioning				
	Testing and Commissioning of Installation	No	1		
	Manuals, Documentation, AS Builts	No	3		
	Training of Personnel	No	2		
CARRIED FORWARD TO SUMMARY PAGE (ELECTRICAL)					

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL
	BILL No. 11: INTRUDER ALARM SYSTEM				
NOTE:	The complete installation must comply with the electrical installation specifications. Therefore Tenders are advised to study the specifications and drawings before pricing the Bill. Installation of an alarm system with localised distinct alarm areas. The plant rooms, sports facility and guard house are to be configured as a single alarm system, with the keypad installed in the Guard house. Indication panels are to be installed in the Admin & Guard house. Alarms must only be able to be reset either locally or from the Master Control in the admin block. The Guard house should be able to arm any area / section left unarmed but <u>should not</u> be able to reset any remote alarms other than its own local alarm. The system will run on its own dedicated backbone				
	Master Alarm Controller unit	Supply	No	3	
		Install	No	3	
	Alarm LED Zone indicator / Mimic Panel	Supply	No	1	
		Install	No	1	
	Full Message hardwired LCD Keyboard	Supply	No	1	
		Install	No	1	
	8 - Zone, hardwired Expander Module	Supply	No	3	
		Install	No	3	
	PIR Motion Detector - Internal	Supply	No	40	
		Install	No	40	
	PIR Motion Detector - External	Supply	No	12	
		Install	No	12	
	Arming Device / 2 or 4 Wireless Button Key	Supply	No	3	
		Install	No	3	
	Wired Panic Button	Supply	No	8	
		Install	No	8	
	Outdoor 15W, Electric Siren, 12VDC, Loud Sounder	Supply	No	4	
		Install	No	4	
	Communication network module. (GSM / GPRS module, TCP/IP module, Serial interface). To link with external security company or SAPS	Supply	No	1	
		Install	No	1	
	Alarm Indicator Light (Exterior, IP66 and mounting accessories)	Supply	m	8	
		Install	m	8	
	Powerpack, 3.2Amp with Battery Space	Supply	No.	8	
		Install	No.	8	
	Total Carried Forward				

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL
	Total Brought Forward				
	Battery, 7ah 12V	Supply No.	No. 3		
	Battery, 18AH 12V	Supply Install	No. 1 1		
	4 pair, twisted, screened, 22swg, alarm cable	Supply Install	m m	4000 4000	
	Glue, 50ml Cable Adhesive	Supply Install	No No	10 10	
	Intruder Alarm Terminal Box. Lockable, Flush mount box with knockouts 300 x 400 x 140mm	Supply Install	No No	3 3	
	Testing and Commissioning				
	Testing and Commissioning of Installation		No	1	
	Manuals, Documentation, AS Builts		No	3	
	Training of Personnel		No	2	
	CARRIED FORWARD TO SUMMARY PAGE (ELECTRICAL)				

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL
NOTE:	BILL No. 12: ACCESS CONTROL				
	The complete installation must comply with the electrical installation specifications. Therefore Tenders are advised to study the specifications and drawings before pricing the Bill.				
	Access Controller				
	Door Access Controller	Supply	No.	30	
		Install	No.	30	
	Gate Access Controller	Supply	No.	8	
		Install	No.	8	
	Roller Shutter Door Access Controller	Supply	No.	12	
		Install	No.	12	
	Door Closer	Supply	No.	15	
		Install	No.	15	
	Magnetic Lock supports static linear thrust of 600kg	Supply	No.	25	
		Install	No.	25	
	Magnetic Lock Bracket	Supply	No.	25	
		Install	No.	25	
	No Touch Exit flush push button complete with back box	Supply	No.	25	
		Install	No.	25	
	GREEN EMERGENCY				
	Break glass green resettable with clear cover, single contact	Supply	No.	25	
		Install	No.	25	
	12V PSU				
	Battery back-up power supply 12V, 3.2Amp with Securi Prod 7.2Amp Battery	Supply	No.	25	
		Install	No.	25	
	BATTERY				
	IDS 12V, 8A Gel SLA Battery	Supply	No.	25	
		Install	No.	25	
	6 Pair Cable	Supply	m	2000	
		Install	m	2000	
	42U Cabinet				
	600mm x 1 000mm Glass Floor Server Cabinet AP6042.GLA.B with lightning protection system, 8 way individually switched, server cabinet fan 220V with finger.	Supply	No.	1	
		Install	No.	1	
	HDMI				
	8K Ultra High Speed HDMI Cable - 6m	Supply	No.	2	
		Install	No.	2	
	WORK STATION				
	High-End Workstation, CCTV cameras and access control	Supply	No.	1	
		Install	No.	1	
	LCD Touch Screen Face Recognition				
	4.3" LCD touch screen face recognition terminal, surface mounted.	Supply	No.	42	
		Install	No.	42	
Total Carried Forward					

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL
	Total Brought Forward				
	Video Intercom Video intercom kit with SD card and 4 port switch POE 4CH 4-port Gigabit unmanaged PoE switch DS-3E0505P-E at security gate house Outdoor Wireless 5Ghz 867Mbps 5km Outdoor wireless CPE at security gate house 43" Monitor 43" FHD LED Monitor Allow for any other items necessary to successfully complete the installation Testing and Commissioning Testing, commissioning and handover of Access Control System Instruction manuals Set of 'as built' drawings	Supply Install Supply Install Supply Install Supply Install Sum	No. No. No. No. No. No. No. No. Sum	1 1 1 1 2 2 2 2 1	
	CARRIED FORWARD TO SUMMARY PAGE (ELECTRICAL)				

SUMMARY PAGE (ELECTRICAL)									
Item	Description	Page No.	Amount						
13	SUMMARY								
13.1	BILL No 1: RETICULATION AND DISTRIBUTION BOARDS	3							
13.2	BILL No 2: MAIN WAREHOUSE - ELECTRICAL INSTALLATIONS	8							
13.3	BILL No 3: OVERFLOW WAREHOUSE - ELECTRICAL INSTALLATIONS	13							
13.4	BILL No 4: WORKSHOP OFFICES - ELECTRICAL INSTALLATIONS	16							
13.5	BILL No 5: STANDBY GENERATOR INSTALLATION	17							
13.6	BILL No 6: UNINTERRUPTIBLE POWER SUPPLY SYSTEM (UPS) INSTALLATION	18							
13.7	BILL No 7 - 10G FIBRE OPTIC BACKBONE NETWORK	20							
13.8	BILL No 8 - CCTV SURVEILLANCE SYSTEM	22							
13.9	BILL No 9 - DATA NETWORK	23							
13.10	BILL No 10 - IP TELEPHONE SYSTEM	24							
13.11	BILL No 11 - INTRUDER ALARM SYSTEM	26							
13.12	BILL No 12 - ACCESS CONTROL SYSTEM	28							
	VERY IMPORTANT NOTES: 1. THE COMPANY TO CARRY OUT THE ICT INFRASTRUCTURE WORK MUST BE SITA REGISTERED. Submit accreditation docs. 2. THE COMPANY THAT WILL DO THE ICT INFRASTRUCTURE MUST BE KRONE CERTIFIED or SIMILAR APPROVED. Submit accreditation docs. 3. THE INDIVIDUALS WHO WILL DO THE ICT INFRASTRUCTURE INSTALLATION MUST BE KRONE CERTIFIED or SIMILAR APPROVED. Submit accreditation documents.								
	TOTAL CARRIED OVER TO FINAL SUMMARY PART A: BUILDING WORKS (EXCLUDING VAT)								
NOTE: ALL RATES AND PRICES EXCLUDE 15% VAT, P's & G's and CONTINGENCIES VAT and P's & G's WILL BE ADDED IN THE FINAL SUM CARRIED TO TENDER FORM <table><tr><td>Contractor's Name</td><td></td></tr><tr><td>Electrical Contractor's Registration Number at the Electrical Contracting Board of South Africa</td><td>Registration No.:</td></tr><tr><td>Name of Registered Person / Firm at ECB</td><td></td></tr></table> NB: Only contractors whose ECB Registration is for Three Phase installations will be considered. CONTRACTOR TO SUBMIT ACCREDITATION DOCUMENTS OF THE ELECTRICAL CONTRACTOR OF CIDB GRADING OF 6EB ON SUBMITTING THIS TENDER DOCUMENT and THE ELECTRICAL CONTRACTOR SHOULD BE ON SITE WITHIN FOURTEEN DAYS OF SITE ESTABLISHING. Signature of person authorised to sign the tender:				Contractor's Name		Electrical Contractor's Registration Number at the Electrical Contracting Board of South Africa	Registration No.:	Name of Registered Person / Firm at ECB	
Contractor's Name									
Electrical Contractor's Registration Number at the Electrical Contracting Board of South Africa	Registration No.:								
Name of Registered Person / Firm at ECB									

BILL NO. 21

PART	EXTERNAL WORKS				
ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
No.	PART -A SITE CLEARING				
	<u>Clear and grub</u>				
	Clear and Grub Grass and shrubs from within the Defined Development Area, spoil all cleared material to "Designated Holding Area". Rate to include Loading Out for others to remove to Spoil off site.	m ²	4916		
1					
2	Remove and grub all trees and tree stumps regardless of girth, and include in clearing in item above.	ha	0.0717		
3	Demolish structures including foundations, slab and stockpile, prior to removal of rubble.	m ²	101		
4	Demolish structures including manholes, slab and stockpile, prior to removal of rubble.	m ²	15		
	Remove rubble from previous demolition including any foundations and slab to "Designated Holding Area". Rate to include Loading Out for others to remove to Spoil off site.	m ³	40.25		
5					
6	Topsoil stripping in preparation for bulk excavations	m ³	107.55		
	BULK EARTHWORKS				
No.	PART -B EARTHWORKS (ROADS, SUBGRADE)				
	<u>Bulk excavation</u>				
	<u>Excavate in all materials and use for embankment or backfill or dispose, as ordered.</u>				
	Excavate suitable material from other areas of cut in the works to pre-prepared areas of Fill to form Bulk Earthworks Platform areas. Compact in layers not exceeding 150mm to 93% mod AASHTO density.	m ³	630		
7					
8	Excavate material from other areas of cut in the works. Unsuitable material to temporary stock on "Designated Holding Area".	m ³	214.5		
	Excavate suitable material from other areas of cut in the works to pre-prepared areas of Fill to form Bulk Earthworks Platform areas. Compact in layers not exceeding 150mm to 93% mod AASHTO density.	m ³	107.4		
9					
10	Excavate material from Road Boxcut to accommodate layerworks. Suitable material to pre-prepare areas of Fill. Compact in layers not exceeding 150mm compacted to 93% mod AASHTO.	m ³	735		
	Import G5 Material from Commercial Source for FINAL 150mm layer of turning area, compact to 98% mod AASHTO density.	m ³	737.4		
11					
12	Import G6 Material from Commercial Source for subgrade 150mm layer of turning area, compact to 95% mod AASHTO density,	m ³	737.4		
	<u>Extra Over items for:-</u>				
13	1) Intermediate excavations within turning area	m ³	73.74		
	2) Hard rock excavations.	m ³	36.87		
	3) Boulder excavations Class 'A'	m ³	Rate only		
	<u>Road-bed preparation and compaction of material to min depth of 150mm. Compacted to 93% mod AASHTO density</u>				
14	(i) To turning area	m ²	4200		
15	(i) To Road way	m ²	716		
	Total Carried Forward				

		Total Brought Forward			
	INFRASTRUCTURAL SERVICES				
No.	<u>PARTS C - PIPE TRENCHES</u>				
16	Excavate in all materials for trenches, backfill, compact, and dispose of surplus material. (Min width 600mm min depth 700mm)	m³	60		
	Supply, lay, bed, and prove duct				
17	110mm dia Cableflex by Nextube (include trim of trench invert and draw wire to duct)	m	100		
18	Imported bedding material, where ordered.	m³	18		
	Cable markers				
19	(b) Kerb marks	No.	20		
	<u>PART- D FIRE WATER SUPPLY</u>				
	MEDIUM PRESSURE PIPELINES				
	<u>Supply, handle, lay, cut, joint and bed pipes on Class B bedding, disinfect and test:</u>				
	<u>(a) uPVC pressure pipes with "Lyng" joints or similar approved (provisional)</u>				
20	(ii) 110 mm dia Class 16	m	100		
	<u>(b) uPVC pressure pipes fittings. Slow 'Z' lock Bends or similar approved.</u>				
21	110mm ø 45 deg	No.	15		
22	110mm ø 90 deg.	No.	10		
	CAST IRON PRESSURE FITTINGS				
	<u>Class-16 Cast Iron Fittings for use with uPVC Pipes. Supply, lay, joint, cut pipes to length where required and test</u>				
	<u>End Caps</u>				
23	110mm dia.	No.	5		
	Equal Tees				
24	45 deg 160mm dia.	No.	5		
	<u>Un-Equal Tees</u>				
25	160mm x 110mm dia.	No.	5		
	<u>Reducers</u>				
26	160mm x 110mm dia.	No.	6		
	<u>Hydrant Tee (include adaptors)</u>				
27	110mm dia.	No.	2		
28	160mm dia.	No.	2		
	Sluice Valves (Gate Valves)				
	<i>Supply, joint, cut pipes to length and test Airworths or similar approved sluice valves to waterworks pattern, Class 16 clockwise closing, non rising spindle, with cap top, complying with SANS 0664 and fitted with Resilient Seal Seats</i>				
29	<u>Extra-over 8.2.1 for the supplying, fixing, and bedding of valves</u>				
	(a) Gate Valves - 110mm dia.	No.			
30	(b) Non-Return Valve complete as detailed on the drawing. 110mm	No.			
32	(c) Hydrant valve, complete installation as shown on the drawings and to local council standards	No.			
	Total Carried Forward				

	Total Brought Forward				
32	(d) Fire Booster connection complete as detailed on the drawing	No.			
33	(e) Non Return Valve and chamber complete as detailed on the drawings etc.	No.			
	<u>Fire Hydrants</u>				
34	Fire hydrants, 80mm pipe Cast Iron Pilar Type, Tamper Prood, to Local Council Specifications	No.	2		
	<u>Valve Access Chambers</u>				
35	200mm dia mPVC pipe Cast in 15 Mpa Concrete with Cast Iron Cover and Frame. Complete	No.	2		
	<u>Anchor - Thrust Blocks and Pedestals</u>				
36	M20 / 19 concrete for anchor blocks	m³	15		
	<u>Special Wrapping in Corrosive Soils</u>				
37	Denzo Tape or simolar approved	m	2		
38	Pressure testing of watermains to SANS 1200 L (Clause 7.3.3)	Sum	1		
	<u>Existing Water Main</u>				
39	Connect to existing (up to 200mm dia.) watermains, excavate in all materials, backfill and compact, cut pipes to length, fit and test the connection. Rate shall include all fittings.	Prov.Sum	1		
40	Construct of Junction Box where the connection of the new watermains and existing mains tie	Prov.Sum	1		
41	Supply, Handle, Construct and fit the required pressure fittings for the installation and provision of Bulk Water meter.	Prov.Sum	1		
	<u>PART - E STORMWATER DRAINAGE</u>				
	SECTION : PIPE TRENCHES				
	EXCAVATION				
	<u>a) Excavate in all materials for pipe trenches, backfill and compact, dispose of excess unsuitable material.</u>				
	<u>Internal-Trenches for stormwater pipes up to 600mm dia. Depth of trench of but not exceeding:</u>				
42	i) For excavation 0m - 1.0m deep	m	100		
43	ii) For excavation 1.0m - 1.5m deep	m	5		
44	iii) For excavation 1.5m - 2.0m deep	m	5		
45	iv) For excavation 2.0m - 2.5m deep	m	Rate only		
	<u>b) Extra over for excavation in:</u>				
46	i) Rock excavation, including removal of boulders	m³	5		
	ii) Trimming of trench bottoms by hand to specified levels				
	Total Carried Forward				

		Total Brought Forward			
	BEDDING (Pipes)				
47	<u>Provide for bedding from trench excavation</u>				
48	a) Selected granular material	m ³	24		
48	(b) Selected Fill material	m ³	18		
	<u>Supply only of bedding by Importation</u>				
49	From Commercial source - Material (13mm crushed stone) to Concrete Pipes only	m ³	15		
	STORMWATER				
	PIPEWORK				
	<u>Supply, handle, lay, Interlocking Concrete Pipe Culverts on Class 'B' bedding (13.2mm Crushed Stone).</u>				
50	i) 450mm dia class 100D	m	20		
	Supply and Install Manholes Catchpits and the like, Construct Composit Brick and Concrete Structures as detail on drawings. Complete.				
51	<u>Catchpits (Kerb Inlets):</u> i) 3.0m long for outgoing pipe up to 450mm dia	No.	2		
52	<u>Catchpits (Grid Inlets):</u> i) Complete with steel grate (max depth 1.5m)	No.	1		
53	<u>Catchpits (600 x 600):</u> i) Complete with 600 x 600 cast Iron Grate and frame (max depth 1,5m)	No	1		
	PART - F ROADWORKS AND PAVING				
	<u>KERBING AND CHANNELLING</u>				
	<u>Concrete kerbing</u>				
	<i>(a) Internal Access Road - Semi-Mountable Pre Cast Kerb (SABS 927-1969 Fig 7) Laid in 40mm Mortar bed with 10 Mpa concrete haunching (0.01m³/m) at joints and continuous on curves.</i>				
54	(i) Straight and curved kerbing with radius > 15m (1m long)	m	134		
55	(ii) Curved kerbing of radius < 15m (300mm long)	m	6		
56	(iii) Curved kerbing of radius < 5m (150mm long)	m	6		
57	(iv) Extra-over (i) for Dop Kerbs 1500mm long. (b) <i>ast-in-Situ Concrete Interface Beams (including Reinf.).</i>	m	5		
58	(i) Straight (Cast in alternate 3m lengths with 10mm joints with Steel continious)	m	89		
59	(i) Curves and straights	m	10		
	Total Carried Forward				

	Total Brought Forward				
	PART - G ROADWORKS AND PAVING				
	PART G - SEGMENTED PAVING				
	Construction of paving complete with 20mm sand bedding, cutting, sanding and rolling to lock up.	m²			
60	(a) Internal Access Road - 80mm Grey Interlocking Paving Blocks Type G Class S-A)	(SABS)			
	SUBBASE				
	[Delayed works to be carried out on completion of building works]				
70	Construct 150mm natural gravel subbase from imported material previously placed on the road by ripping and compacted to 95% of mod. AASHTO density. (UCS>0.75Mpa - 1.5Mpa at 100%)	m³	737.55		
	E.O item B-2.20 above for process subbase material by the following process:-				
71	d) Stabilisation.	m³	737.55		
72	Stabilising Agent CEM II 32.5	Ton	14.751		
No.	PART H - ANCILLIARY ROAD WORKS (ROAD SIGNS AND MARKINGS)				
	SECTION: ANCILLIARY ROAD WORKS				
	Permanent Road Signs				
	Sign faces Series 900 provided with high grade retro-reflective back ground, characters,symbols, legends and borders. Complete, mounted on painted steel poles (76mm dia x 2.5mm), planted in positions shown on the drawings				
73	a) Regulatory sign R1	No	2		
	Road Markings				
	Non reflectorised road paint applied at nominal rate of 0.42 l/m2				
74	(a) White lines 100mm wide	m	20		
75	(b) White lines 300mm wide	m	16		
76	(c) White characters and symbols	m2	30		
	Setting out and Premarking				
77	Lines and Special markings	lump sum	1		
	Total Carried to Summary				

BUILDING UPGRADE FOR MEGA STORE WAREHOUSE IN LANGLAAGTE		
BILL NO.	FINAL SUMMARY	AMOUNT
1	Preliminaries and General	
	Sub Total (Bill 1)	
2	Alterations	
3	Earthworks	
4	Concrete, Formwork and Reinforcement	
5	Masonry	
6	Waterproofing	
7	Roof Coverings	
8	Carpentry and Joinery	
9	Ceilings, Partitions and Access Flooring	
10	Floor Coverings, Wall Linings, Etc	
11	Ironmongery	
12	Structural Steelwork	
13	Metalwork	
14	Plastering	
15	Tiling	
16	Plumbing and Drainage	
17	Glazing	
18	Paintwork	
	Sub Total (Bill 2-18)	
19	Provisional Sums	
20	Electrical Installations	
21	External Works	

BUILDING UPGRADE FOR MEGA STORE WAREHOUSE IN LANGLAAGTE DEPOT		
	FINAL SUMMARY	AMOUNT
1 (Bill 1)	Preliminaries and General	
2 (Bill 2-18)	Building Works	
3 (Bill 19)	Provisional Sums	
4 (Bill 20)	Electrical and Electronic Installation	
5 (Bill 21)	External Works	
	Sub Total	
	Allow a contingency amount of 10% (Ten Percent) to be used as directed by the Client.	
	Add Value Added Tax 15% (Fifteen Percent)	
	TOTAL CARRIED TO FORM OF OFFER	



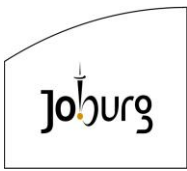
CONTRACT JW14452

BUILDING UPGRADE FOR THE MEGA WAREHOUSE

IN LANGLAAGTE DEPOT

VOLUME 2

PART 3: SCOPE OF WORK



PART 3 SCOPE OF WORK

GENERAL

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

SCOPE

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

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

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

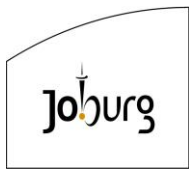
Portion 3: PARTICULAR SPECIFICATIONS covers particular specifications which are applicable to Building, Plumbing and Electrical works.

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

STATUS

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

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



Part 3: Scope of Work

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PORTION 1: PROJECT DESCRIPTION AND GENERAL INFORMATION

1 DESCRIPTION OF THE WORKS

1.1 EMPLOYER'S OBJECTIVES

Johannesburg Water (JW) is undertaking the refurbishment and upgrade of existing buildings at its Langlaagte Depot to create a Central Mega Storage Facility. This project involves converting two warehouse buildings and the surrounding supporting infrastructure into a mega storage facility. The larger warehouse of the two will serve as the primary storage facility while the smaller warehouse will function as an overflow facility.

To achieve these objectives, JW is seeking a suitably qualified contractor with a CIDB grading of 7GB or higher to serve as the main contractor for this project.

1.2 BACKGROUND OF THE PROJECT

JW plans to convert two existing warehouse buildings at its Langlaagte Depot into a centralized Mega Storage Facility. This facility is intended to streamline material management across JW's satellite stores, ensuring continuous availability and reducing the time required for inventory replenishment. The centralization of these processes will enable bulk purchasing, improve efficiency, and enhance JW's overall service delivery.

The conversion plan involves re purposing the two warehouse buildings at the depot. The larger building is designated as the primary storage facility, while the smaller building will serve as a storage overflow facility. Currently, the building intended for the mega store accommodates the Operations Technical Services Team and is used as a parking area for JW vehicles. Similarly, the proposed overflow building is also utilized for vehicle parking.

To facilitate the conversion, a detailed inspection and condition assessment of the two warehouse buildings were conducted. These assessments were critical in determining the suitability of the existing infrastructure for its new role as a central storage facility. The findings from these inspections informed the necessary upgrades and modifications required to transition the buildings from their current use to a centralized storage hub.

Additionally, JW has requested the construction of four new offices within the adjacent workshop building. These offices are intended to accommodate the Technical Services Team, who are responsible for managing workshop operations and are currently located in the warehouse slated for conversion into the mega store. The relocation of this team is essential to free up space in the primary warehouse building, allowing for its transformation into the central storage facility.

Part 3: Scope of Work

The scope of work covers various disciplines, including architectural, structural, electrical, mechanical, water and sanitation, roads, and storm water systems, ensuring a comprehensive upgrade and refurbishment of the facilities to meet the demands of JW's centralized inventory management strategy.

1.3 OVERVIEW OF THE WORKS

Locations of The Works

The JW Langlaagte Depot is located at 2 Link Road, Langlaagte, Johannesburg in Gauteng Province. The site is bound by Link Road on the north-western side and Kwagga Street on the eastern side. The site is currently being occupied by JW's Operations and Technical Services Team.

The site coordinates are as follows:

Latitude: 26°12'14" S

Longitude: 27°59'03" E

Site Description

There are several buildings on the Langlaagte depot premises, with the proposed mega storage and storage overflow buildings located in the northern end of the site. Most of the ground is covered with asphalt surfacing, while some buildings are landscaped with vegetation around. The topography of the site consists of a slight slope running from north to south. Several catchments drains to channel water into the municipal storm water networks were identified across the site.

Existing Building Layout

The western side of the building designated for the mega store is located approximately 20 meters from the workshop building, while the eastern side features a large open area with the existing Langlaagte store building situated around 55 meters away. To the north, the proposed overflow warehouse is approximately 17 meters from the mega store building. The spatial layout of these buildings presents certain constraints and opportunities for the facility's operations.

Figure 1 below shows the spatial layout of the existing buildings.

Part 3: Scope of Work



Figure 1: Spatial layout of Existing buildings

The limited 20-meter space between the mega store and the workshop building restricts the manoeuvring of larger articulated trucks, making this area more suitable for dispatch operations involving smaller and medium-sized vehicles to satellite stores. Conversely, the expansive eastern side is ideal for receiving bulk deliveries via larger trucks. The existing fencing in this area may be removed to create additional space for vehicle movement, and any materials currently stored here can be relocated within the premises.

The project footprint covers the following warehouse buildings:

1. Proposed Mega Storage Warehouse
2. Proposed Storage Overflow Warehouse
3. Existing Workshop Warehouse

The following sections discuss the proposed functional areas that within the buildings mentioned above.

Mega Storage Warehouse

The transformation of the current warehouse into the Mega Storage Warehouse will involve dividing the space into several functional areas which include the following:

- **Storage and Office Area:** This large, open area features a high roof, allowing for 5-meter-high storage racks to accommodate bulk orders. It will include shelving racks of varying

Part 3: Scope of Work

heights to ensure efficient stock management. Eight offices will be integrated to meet JW's operational requirements, providing a command hub for effective management. Additional facilities, such as a kitchenette and dedicated ablution areas, will enhance the working environment.

- **Pipe and Gas Storage Area:** The southern steel canopy shed will be designated for pipe and gas storage, with a larger area for pipes. The shed offers weather protection, while the open sides ensure adequate ventilation. This area will include high racks for pipe storage and secure fencing to control access. A designated zone within this space will safely segregate and store various gases.
- **Chemical Store Area:** The northern locker and office area will be converted into a specialized chemical storage facility, with dedicated zones for different chemical types. Safety measures, including spill containment, labeling, and organization, will ensure compliance with industry standards.

Storage Overflow Warehouse

The overflow building will provide additional storage capacity adjacent to the mega store. With a high roof height, the facility can accommodate 3-meter-high storage racks, optimizing space for inventory overflow. The floor plan will include designated zones for shelved materials and pallet storage, offering flexibility for different types of inventories.

Alterations to the Existing Workshop

Modifications to the existing workshop will create four new offices for the operations team. The offices will be separated from the workshop by a wall, with an access opening to facilitate movement between the spaces. The area currently used for depot overflow storage will be repurposed for these offices, requiring the relocation of stored items.

2 SCOPE OF WORKS

2.1 SUMMARY OF WORKS

The scope of work for the various disciplines at the Langlaagte Depot can be summarized as follows, but is not limited to:

Architectural Works

The architectural scope encompasses comprehensive refurbishments and upgrades for the transformation of the Langlaagte Depot buildings into a Central Mega Warehouse. The work is divided across three primary buildings:

Part 3: Scope of Work

Mega Store Building (1344m²):

- **Internal and External Refurbishment:** Refurbishment of face brick walls both internally and externally to enhance appearance and structural integrity.
- **Roof Covering:** Replacement and/or refurbishment of roof coverings to ensure waterproofing and durability.
- **Plastering and Painting:** Complete plaster and paintwork for aesthetic improvement and surface protection.
- **Facia Boards, Gutters, and Downpipes:** Installation and replacement of facia boards, gutters, and downpipes to manage rainwater effectively.
- **Interior Layout:** Installation of drywall partitioning, insulation, and suspended ceilings to optimize space usage and energy efficiency.
- **Plumbing and Sanitary Fittings:** Upgrades to plumbing works and installation of new sanitary fittings in all ablution areas.
- **Tiling and Floor Screed:** Application of new tiling and floor screed for durability and easy maintenance.

Overflow Storage Building (575m²):

- **Internal and External Refurbishment:** Similar refurbishment of face brick walls as the mega store.
- **Roof Covering:** Replacement and/or refurbishment of roof coverings to ensure long-term performance.
- **Plastering and Painting:** Comprehensive plaster and paintwork to update the building's appearance.
- **Tiling and Floor Screed:** Installation of new tiling and floor screed for functionality and aesthetics.
- **Facia Boards, Gutters, and Downpipes:** Installation of necessary facia boards, gutters, and downpipes.

Workshop Building (62m²):

- **Interior Improvements:** Drywall partitioning, insulation, and suspended ceilings to improve workspace efficiency and comfort.

Part 3: Scope of Work

- **Tiling and Floor Screed:** Application of tiling and floor screed for durability and easy maintenance.

Structural Works

The structural scope focuses on modifications and enhancements to support the new functions of the buildings:

Mega Store Building:

- **Steel Structure Refurbishment:** Refurbishment of the existing steel structure to ensure protection against corrosion.
- **Foundations and Surface Beds:** Construction of new strip footings, structural brickwork, surface beds and timber roof structures for the extension of the existing ablution facilities.
- **Concrete Repairs:** Repairs to existing surface beds and joints to address wear and ensure structural integrity.

Overflow Storage Building:

- **Steel Structure Refurbishment:** Similar refurbishment of the existing steel structure as in the mega store.
- **Concrete Repairs:** Concrete repairs to surface beds and joints.
- **Foundations and Surface Beds:** Construction of new strip footings and surface beds to create a new receiving bay.

Workshop Building:

- **Concrete Repairs:** Repairs to existing surface beds and joints.
- **Security Frame:** Installation of a security frame over offices to enhance security.

Electrical Works

The electrical scope aims to modernize and enhance the facility's electrical infrastructure and involves the following:

Mega Store Building:

Part 3: Scope of Work

- **Electrical Infrastructure:** Supply, installation, testing, and commissioning of LV supply cables, HDPE cable sleeves, and small power installations.
- **Lighting and Power Systems:** Installation of lighting, a 110kVA generator with a bunded fuel tank, a 20kVA U, and a 60kWp photovoltaic solar system.
- **Data and Security Systems:** Installation of a 10Gig fibre optic network, CCTV surveillance, data network, IP telephone system, intruder alarm system, and access control system.
- **Testing and Documentation:** Comprehensive testing, commissioning, and provision of as-installed drawings and manuals.

Overflow Storage Building:

- **Electrical Infrastructure:** Similar scope as the mega store including LV supply cables, lighting, small power installations, and data/security systems.
- **Testing and Documentation:** Similar testing, commissioning, and documentation as the mega store.

Workshop Building:

- **Electrical Infrastructure:** Installation of small power, lighting, earthing, and lightning protection systems.
- **Data and Security Systems:** Installation of data network, IP telephone system, intruder alarm, and access control systems.
- **Testing and Documentation:** Similar testing, commissioning, and provision of documentation as the other buildings.

Mechanical Works

The mechanical upgrades and refurbishments for the megastore warehouse are crucial due to the nature of the materials that will be stored, which includes hazardous chemicals. Although preliminary mechanical designs for the facility have been done, a detailed design and installation must be performed by a specialist. The specialist should be registered with the South African Qualification and Certification Committee (SAQCC) and comply with the fire department's requirements. The scope of the specialist will include the following:

- **Fire Detection and Suppression:** Installation of an advanced fire detection and suppression system, including sprinklers, hydrants, hose reels, and fire extinguishers to ensure facility safety.

Part 3: Scope of Work

- **HVAC System:** Installation of a new HVAC system to maintain optimal conditions within the warehouse, including specialized ventilation for hazardous material storage areas.
- **Hot and Wet Services:** Installation and commissioning of hot and cold water systems, including water heating units, plumbing fixtures, and associated piping, to ensure the provision of reliable water services throughout the facility.

Roads and Stormwater

- **Site Preparation:** Bulk earthworks and layer-works to create a stable foundation for new infrastructure.
- **Stormwater Management:** Cleaning and unblocking of existing stormwater services, construction and repair of stormwater manholes, and refurbishment of the stormwater system to ensure effective drainage.
- **Paving and Repairs:** Construction of new kerbs, channels, and paving, along with asphalt patching to repair existing surfaces and improve traffic flow.

External Works

- **Fencing:** Removal of existing fencing and construction of new concrete stormwater structures to improve functionality.

2.2

TEMPORARY WORKS

For the Mega Store Warehouse project, the temporary works are crucial to ensure the safety, stability, and efficiency of the construction process. The following temporary works should be specified:

Temporary Support Structures

- **Shoring:** Temporary shoring systems may be required to support existing structures during demolition or refurbishment activities, particularly when removing or altering load-bearing walls.
- **Propping:** Temporary pro to support roofs, floors, or other structural elements while permanent works are being carried out.

Temporary Access and Safety Measures

- **Scaffolding:** Erect scaffolding to provide safe access to high work areas, including the roof, ceilings, and external walls for refurbishment tasks. The scaffolding must comply with all relevant safety standards.

Part 3: Scope of Work

- **Access Platforms:** Temporary access platforms may be needed for working at height, particularly during the installation of HVAC systems, electrical works, and fire suppression systems.
- **Safety Barriers:** Install safety barriers around excavations, open trenches, or other hazardous areas to prevent accidental falls or unauthorized access.

Temporary Enclosures

- **Weather Protection:** Temporary enclosures to protect ongoing works from adverse weather conditions, especially during roofing and external wall refurbishment. This may include tarpaulins, temporary roofing, or shrink-wrap systems.

Dust and Noise Control: Erect temporary enclosures or barriers to contain dust and reduce noise levels in sensitive areas, particularly near occupied buildings.

Temporary Utilities

Temporary Water Supply: Provide a temporary water supply for construction activities, including dust suppression, concrete mixing, and worker amenities.

Temporary Electrical Supply: Set up a temporary electrical supply to power tools, lighting, and other construction equipment. This may include temporary distribution boards and cables.

Sanitary Facilities: Temporary portable toilets and wash stations should be provided for workers on-site.

Temporary Traffic and Site Access Management

- **Temporary Roads and Pathways:** Construct temporary access roads and pathways to facilitate the movement of construction vehicles and personnel, particularly where existing surfaces are being modified.
- **Traffic Control:** Implement temporary traffic control measures, such as signage, barriers, and flagmen, to manage the flow of vehicles and ensure safety during construction.

Site Hoarding and Security

- **Site Hoarding:** Erect temporary hoarding around the construction site to secure the area and prevent unauthorized access. The hoarding should include gates for controlled access.
- **Security Lighting and Surveillance:** Install temporary security lighting and surveillance systems to monitor the site, particularly during non-working hours.

Part 3: Scope of Work

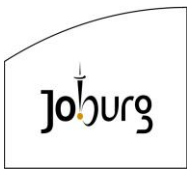
Temporary Drainage and Water Management

- **Temporary Drainage Systems:** Set up temporary drainage systems to manage surface water runoff and prevent flooding during construction, especially when existing stormwater systems are being modified.
- **Water Pumping:** Temporary water pumping may be required to keep excavations dry or to manage water from dewatering operations.

Temporary Storage Areas

- **Material Storage:** Designate temporary storage areas for materials, equipment, and waste. These areas should be organized to ensure efficient access and minimize the risk of damage or theft.
- **Hazardous Material Storage:** Set up temporary storage facilities for hazardous materials, such as chemicals or gas cylinders, in compliance with safety regulations.

These temporary works should be carefully planned and implemented to support the safe and efficient execution of the Mega Store Warehouse project.



Part 3: Scope of Work

3 PRINCIPAL AGENT

3.1 EMPLOYER'S DESIGN

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

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

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

In case of the principal agent's acceptance of an alternative proposal, the Contractor shall submit in triplicate to the Engineer for his approval, detailed working drawings of the Contractor's alternative design proposal before any related work is executed.

An extension of Time for Completion of the Contract due to time spent on the alteration of the tender drawings to suit the Contractor's alternative proposals or due to time spent in obtaining the principal agent's approval of such alternatives, shall not be considered.

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

3.2 DRAWINGS

3.2.1 VOLUME 2

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

DRAWING NUMBER	DESCRIPTION	REV
NAME BOARD		
ECS328-GEN-001	PROJECT NAME BOARD INFORMATION	A
ARCHITECTURAL		
ECS328-Arch-001	Detailed Layout of Refurbishments and Upgrades at Mega store, Overflow and workshop buildings	A
ECS328-Arch-002	Mega Store Building Sections	A
ECS328-Arch-003	Existing Plan Layout for Demolitions	A
ECS328-Arch-004	Mega Store Elevations	A
STRUCTURAL		
ECS328-STR-005	Ablution Block Layout And Typical Strip Foundation Details	A
ECS328-STR-004	Surface Bed Layout And Detail	A
ROADS AND STORM WATER		
ECS328-SW-001	Roads and Storm water General Layout and Details	A
ECS328-TR-001	Paving Setting Out	A
ELECTRICAL		
ECS328/E-001	Lighting Layout	A
ECS328/E-002	Small power layout	A
ECS328/E-003	Wiring Channel and Wire Mesh Layout	A
ECS328/E-004	Earthing System Layout	A
ECS328/E-005	Lightning protection System	A
ECS328/E-006	CCTV System Layout	A
ECS328/E-007	Access Control System Layout	A
ECS328/E-008	Intruder Alarm System Layout	A
MECHANICAL		
ECS328/M-001	Mechanical - HVAC	A
ECS328/M-001	Mechanical – Wet Services preliminary layout	A
ECS328/M-001	Mechanical – Fire Services Preliminary Sketch	A

3.2.2 CONSTRUCTION DRAWINGS

Upon receiving the instruction to commence with the Works the Contractor shall receive 3 sets of construction drawings, of which 1 set shall be designated for as-built records and updated by the Contractor. The latter shall be:

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

3.3 INFORMATION SUPPLIED BY EMPLOYER

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

3.4 DESIGN SERVICE AND ACTIVITY MATRIX

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

4 PROCUREMENT

4.1 PREFERENTIAL PROCUREMENT PROCEDURES

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

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

These schedules contain all requirements with regard to preferential procurement.

4.2 SUBCONTRACTING

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

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

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

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

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

The Contractor is:

Part 3: Scope of Work

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

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

Note:

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

The Contractor shall be expected to enter into a contract with the nominated or selected subcontractor(s). The Employer must be supplied with a copy of the contract/agreement for records.

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

The sub-contractor carrying out works as per **item 2.1** must be minimum **3CE/GB** CIDB graded, for building works and works on structures.

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

In the execution of the Subcontract Work, the Contractor shall ensure that the Subcontractor(s) comply with all relevant legislation and regulations including, but not confined to, the Occupational Health and Safety Act. The Contractor hereby indemnifies the Employer against any loss, damage, or claim for Subcontract Works.

4.2.1 PERFORMANCE AND EXECUTION OF THE SUBCONTRACT WORK

The main contractor must ensure that his subcontractors shall supply sufficient, suitable resources (e.g. equipment, labour, material) to execute all the Subcontract Work including the portion identified by the Employer as outlined in the Scope of **Work 2.1** and Bill of Quantities.

Part 3: Scope of Work

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

4.2.2 QUALITY OF THE SUBCONTRACT WORK

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

4.2.3 LAWS AND REGULATIONS

The Contractor shall ensure that the subcontractor(s) complies with the paying all amounts due in respect of his employees and himself in terms of all relevant legislation and regulations including, but not confined to, the following:

- Income Tax Act,
- Compensation for Occupational Injuries and Diseases Act,
- Unemployment Insurance Act,
- Basic Conditions of Employment Act.

4.2.4 RESOURCES TO COMPLETE SUBCONTRACT WORK

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

4.2.5 PAYMENT

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

4.2.6 RETENTION MONIES

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

4.2.7 RESOLUTION OF DISPUTES

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

4.3 PARTICIPATION OF TARGETED LABOUR

4.3.1 MINIMUM TARGETED LABOUR CONTRACT PARTICIPATION GOAL

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

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

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

The specified minimum targeted labour Contract Participation Goal (CPG_L) is **100%** for all brick laying, plastering, paintwork, block paving and floor tiling in the project.

4.3.2 DEFINITIONS

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

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

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

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

Part 3: Scope of Work

“Threshold value” is R300.00 per day. The threshold value is not to be confused with any industry sector minimum wage determined in accordance with the Basic Conditions of Employment Act, No. 75 of 1977.

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

4.3.3 THE SELECTION AND RECRUITMENT OF TARGETED LABOUR

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

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

4.3.4 CONTRACT PARTICIPATION GOAL CREDITS

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

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

4.3.5 TRAINING OF TARGETED LABOUR

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

Part 3: Scope of Work

4.3.6 PENALTIES

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

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

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

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

P^* = the value of the contract.

4.4 COMMUNITY LIAISON OFFICER

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

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

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

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

4.4.1 APPOINTMENT, OFFICE AND REPLACEMENT OF CLO

- The CLO will be appointed for the duration of the construction phase of this Contract.

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

4.4.2 DUTIES OF THE CLO

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

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- He will liaise regularly with the Project Steering Committee to ensure that their co-operation is obtained and their decisions accommodated. He will thus act as a liaison officer between the Contractors on site and the local community through the project committee.
- He will be involved in all SMME related matters (Contracts, terminations etc)

4.4.3 SCHEDULED ITEMS

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

The tendered sum shall include full compensation for the provisions of the CLO including salary, provision of an office, transport costs, the cost of typing, printing and distributing notices, and for all other obligations. The CLO salary will be communicated by JW at commencement of construction.

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

The Contractor must allow R1 000,00/month per CLO for work related calls. Calls above this amount will be for the CLO account.

PORTION 2: VARIATIONS AND ADDITIONS TO THE STANDARDISED SPECIFICATIONS

5 GENERAL CONDITIONS AND APPLICABLE STANDARDS

5.1.1 CONDITIONS

The Conditions of Contract are the **JBCC Series 2000 Principal Building Agreement (July 2018 5th Edition)** published by the Joint Building Contract Committee. Copies of these documents may be obtained from the **Association of South African Quantity Surveyors** (011-315 4140), the **Master Builders Association** (011-205 9000), the **South African Association of Consulting Engineers** (011-463 2022) or the **South African Institute of Architects** (011-486 0684).

6 CIVIL ENGINEERING STANDARD SPECIFICATION

-6.1 MEASUREMENT AND PAYMENT

B1. SECTION 1200A: GENERAL REQUIREMENTS AND PROVISIONS

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

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

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

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

Item	Unit
A 8.8.4 Existing services	
b) Excavation by hand in soft material to expose services in:	
1) In roadways	m ³

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2) In all other areas m³

The rate shall be cubic metre for hand excavation in order to determine existing services. The rate shall make full provision for taking the necessary site to identify, excavate and protect existing services for the duration of the contract.

Item	Unit
A 8.8.7 Dismantling of roof structure and dispose unwanted material of existing Roof structure (Rate includes additional excavation, haulage and dump site cost)	Sum

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

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

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

PORTION C: PARTICULAR PROJECT SPECIFICATION

7 ARCHITECTURAL – STANDARD SPECIFICATION

7.1 BUILDING QUALITY AND DURABILITY

The completed mega store facility including roof structure, slabs and walls should be designed to have a minimum designed life span of 60 years.

It should be built to last and be easy to maintain based on whole life cost principles.

Where practicable the design team should require appropriate insurance backed guarantee from manufacturers for the building constituent elements. The extent of the guarantee to be based where practical on the designed life span of the various constituent components as set out in this section

Part 3: Scope of Work

7.2 METHODS OF CONSTRUCTION

It must be possible to safely undertake maintenance work and to repair or replace components of the building such as fittings, finishes and services with minimum disruption and cost when necessary.

7.3 STANDARDS

All structures must comply with the standards set out in the National Building Regulations and SABS/SANS or other Municipal By-Laws.

Structures must have a degree of robustness, so that they are unlikely to be sensitive to adverse effects, such as misuse or accident, leading to damage disproportionate to the cause. Detailed consideration at design stage should be given to the safety of the building envelope both during construction and in use.

The building structure should be serviceable. Deformation, movement, cracking and vibration should comply with the requirements of the relevant codes of practice for structural design and, in addition, must not impair the use of the building during its design life. Deterioration or defects should be limited, and appearance should remain acceptable.

7.4 REINFORCED FLOORS

The design lifespan of the reinforced floor and its components must not be less than the overall lifespan of the building.

7.5 WALLS

The design lifespan of the walls and its components must not be less than the overall lifespan of the building.

The impact and weather resistance of material used in the school environment is an important factor and needs to be considered when selecting materials during the design stage and when construction commences.

External leaf

- Face-brick type FBS (clay) solid
- 12mm thick Fibre cement sheeting on wall ducts
- Reinforced Concrete Retaining Walls

Internal Leaf

- 90mm Galvanized Steel Stud in drywall (with appropriate impact resistant plasterboard lining) with 63mm glass wool drywall insulation.

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7.6 ROOFS

All roofs: The design lifespan of the roofs and its components must not be less than the overall lifespan of the building.

Klip Tite Profile – 0.58mm thick sheeting or factory pre-painted metal sheeting with zinc galvanized coating inside and outside painted with factory colour finish coating as per architect decision in the overall design and colour scheme schedule. Overall sheet weight 6,6 Kg/m².

Secure barrier under the roof sheeting (new Offices)

Supply and Install security grid above the ceiling, VEM 320 J expanded metal mesh fixed to bottom of trusses with 40x0.5 hat channels @ 400 centers with 12x20 tek screws. This will be dependent on every site after considering the load on the trusses upon assessment.

7.7 FLOOR FINISHES

Materials should be suitable robust and durable, taking account of location, exposure and function. Details and junctions of materials should be robust yet refined.

Floor finishes shall be contract quality, hard wearing and durable, consistent with room use, and requiring low maintenance.

Floor finishes shall be slip resistant in all areas where the function and use of the room may create a slip hazard and in particular toilets, wet areas and other areas where the floor may become wet or damp. Architects should also consider the particular risk associated with junctions between surfaces with different slip resistances.

Epoxy floor in (Main warehouse storage)

Porcelain Tiles or Anti-Slip Porcelain Tiles with sizes (500mm x 500mm) or (300mm x 300mm)
(Bathrooms, Offices and Kitchen)

Granolite painted with floor paint (Dispatch areas)

7.8 WALL FINISHES

Wall finishes to be durable, washable, low maintenance and consistent with room use.

Plaster and Paint Coated finish (durable and washable). Up to U/S of suspended ceilings. In wet rooms above 1500mm wall tiled surface up to U/S of suspended ceilings.

Gloss Ceramic Tiles with sizes (150mm x 150mm) or (300mm x 150mm) with aluminum coping strip to be installed as transition line to above plastered area of the wall.

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Wall Skirting: supply and install 19mm x 76mm meranti skirting board screwed to wall plug with 19mm meranti quarter round nailed to meranti board. All nails and screws to be recessed and filled with wood filler. Finish with two (2) coats of dark oak polyurethane base varnish

7.9 CEILINGS

Ceiling finishes to be durable, low maintenance and consistent with room use. Suspension system: To include all hangers, fixings, main runners, cross members, primary channels, perimeter trims, splines, noggins, cli, bracing, bridging, etc., which are necessary to complete the installation and achieve the performance specified as recommended by the suspended ceiling/membrane manufacturer.

Acoustic Suspended Ceilings:

- Nominal grid of 1200mm x 600mm. 15mm thick acoustic ceiling panels for noise performance no less than 32dB in offices
- Fiber-Cement / Vinyl Suspended Ceilings in Ablutions, Kitchen, Toilets:
- Nominal grid of 1200mm x 600mm. 8mm thick fiber cement ceiling panels with vinyl sheet finish

7.10 INSULATION OF BUILDINGS

- Insulation under the roof sheeting
- High reflective double sided bubble foil laminate insulation membrane with 10 to 25mm airspace combined thickness.
- Insulation over the suspended ceilings
- Mineral wool with fiberglass combination with 125mm thickness in compliance with SANS10400 Part XA for Climate Zone 1.

FITTED JOINERY

All fitted joinery to be contract quality, robust, fit for purpose and suitable for use in warehouse storage. All joinery as per approved details and specifications in terms of materials and its durability.

All work to be made of Caesar stone work to.

7.11 IRONMONGERY

- All ironmongery shall be designed for heavy duty use and must be provided in anodized

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aluminum or stainless steel handles with 150mm x 150mm aluminum back plate screwed to the door panel, appropriate to the level and frequency of use.

- All doors must be provided with an individual keyed cylinder lock, and a master keyed facility must also be provided for all doors.

1.1 All window openings and associated ironmongery must be designed as not to present a hazard when opened or allow occupants to fall from a height.

7.12 WINDOWS

- Windows and/or combination with shop fronts should have a minimum design life span of 40 years. Windows must be of robust construction and comply with relevant SANS10400 and SABS requirements. All windows must be safe in closed and open positions.
- The complete window or combination assembly (frame and glazing) must be considered when calculating the appropriate U-Value for the entire building.
- Windows must be easy to clean and maintain or replace in a safe manner. All windows or combination with shop fronts installations shall include all products, fixings, and interface components necessary to provide a watertight/waterproofing/dpc enclosure when tested in accordance with SABS.
- All window frames to be made of mild steel elements to be protected of weather elements with 2 coats of anti-corrosive and 2 coats of exterior enamel. Finish paint colour to be approved by the Departmental Professional Architect.
- All welding of window mild steel elements shall be SABS compliant. Additional 32mm wide x 4mm thick flat bar elements shall be welded to the standard windows in order to improve safety access to the room within the anti-vandalism or anti-theft security requirements.

7.13 GLAZING

All glazing works shall comply with SANS 10400-N:- The application of the National Building Regulations Part N: Glazing, SANS 10137 - The installation of glazing in buildings and SANS -- Safety and security glazing materials for buildings – Part 1: Safety performance of glazing materials under human impact.

1.2 Clear Safety Glass:

- 4mm thick safety glass pane in all mild steel window frames.
- 6mm thick safety glass pane in all aluminum doors leafs.
- Clear safety glass shall be installed in all windows and doors where no privacy is highly required.

1.3 Obscure Safety Glass:

Part 3: Scope of Work

- 4mm thick safety obscure glass pane in all mild steel window frames.
- 6mm thick safety obscure glass pane in all aluminum doors leafs.
- Obscure safety glass shall be installed in the following rooms in the schools:
- In all ablution rooms
- In all store rooms

7.14 DOORS

All doors should have a minimum guaranteed life span of 15 years. Due to the wear and tear of the activities it will be necessary in all instances internally to provide solid core doors with horizontal slats in both sides.

In addition to any fire safety requirements in compliance with SANS10400 Part T which have to be met, it is also necessary to provide 200mm wide x 600mm high vision panels made of safety fire resistant glass in all internal fire doors, internal offices and chemical store

Door leafs made of mild steel plate for rooms exposed to direct weather elements or any spillage of oil or water. These door types shall be lockable with padlocks.

Doors to be painted to colour specified by the architect.

All Fire Hose Reels (FHR) closets to have a solid door with 600mm wide x 350mm high viewing clear safety glass panel with upper cascd word in basic color signal red "FIRE" (Code A11) painted in the glass. These doors to be painted signal red with paint code A11 as well defined in the fire consultant technical documentation and in compliance with SANS 1091. Aluminum doors with glass panels to comply with SANS10400 Part N:2012 where the aluminum elements shall be anodized but not powder paint coated.

7.15 GATES

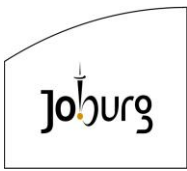
All gates should have a minimum guaranteed life span of 15 years. Due to the wear and tear of activities and low maintenance requirements, gates shall be zinc galvanized.

All gates to have installed self-lock set with master keyed cylinder lock and a hook to maintain open the gate while the room is occupied to comply with the SANS10400 Part T and Municipal Fire by laws.

7.16 SANITARY WARE AND FITTINGS

All internal and external plumbing/sanitary installations to comply with the requirements of SANS 10400:2010:

- Part P: Drainage
- Part Q: Non-water-borne means of sanitary disposal



Part 3: Scope of Work

- Part R: Storm water Disposal
- Part T: Fire Protection
- Part W: Fire Installation
- Part XA: Energy Usage in Buildings
- Part XB: Water Conservation

7.17 ACCESS AND PARKING

Security guards are stationed at the guardhouse.

Entrances will be separated for safety and convenience purposes. There will be a dedicated pedestrian entrance and a dedicated vehicular entrance.

Vehicular entrances will have a minimum width of 6000 mm, of which will adequately accommodate for 2way traffic, for vehicles entering and regressing the site. The entrance will also be designed to allow for large emergency vehicles such as for fire and other service vehicle when needed.

Part 3: Scope of Work

8 STRUCTURAL ENGINEERING – standard specifications

8.1 BRICKWORK

8.1.1 SAND

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

8.1.2 Cement

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

8.1.3 Mortar Mixing

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

8.1.4 Cement Mortar

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

8.1.5 Bricks

Bricks shall be of best quality, hard, sound, even size and shape and equal to samples submitted to and approved by the Engineer. All load and non-load bearing bricks shall have a minimum crushing strength of 14 MPa. Face bricks shall have a maximum water absorption of 15%. Consideration will be given to the use of cement bricks should clay bricks of adequate quality is not available.

8.1.6 Setting Out Accuracy

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

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

8.1.7 Construction of Brickwork

Part 3: Scope of Work

All brickwork shall be built in stretcher bond with brick force every 4th Course. Only whole bricks may be used except where legitimately required for bond. The bricks shall be well wetted with water before being laid and the course laid last shall be well wetted before bedding fresh bricks upon it. All bricks shall be carried up plump and level. The brickwork shall have joints flushed solid at every course throughout the whole width of each course and bricks shall be laid on solid bed mortar. The joints of all walls to be plastered or tiled shall be raked out as the work proceeds to form a key. All walls shall be carried up regularly so that no part is more than 1,2m higher than the adjoining wall. Mortar beds generally, unless otherwise described, shall not exceed 10mm in thickness. Ties between brick walls shall consist of every 4th course of new brick being built into existing wall by half a brick length.

8.1.8 Cleaning Off

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

8.2....ROOF STRUCTURE AND COVERING

8.2.1 Roof Structure

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

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

8.2.2 Roof Covering

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

8.2.3 Insulation of Roofs

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

8.2.4 Ceilings

Ceilings shall be as per the drawings.

8.2.5 Gutters and Down Pipes

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

8.3....PLASTERING

8.3.1 Cement

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

8.3.2 Lime

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

8.3.3 Sand

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

8.3.4 Preparatory Work

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

8.3.5 Finish

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

8.3.6 Thickness of Plaster

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

8.3.7 Cement Plaster

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

8.3.8 Descriptions

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

8.4.....STRUCTURAL CONCRETE

8.4.1 Scope

This specification outlines the requirements for the production, placement, and curing of 25 MPa concrete for structural and non-structural elements in compliance with South African standards.

8.4.2 Standards

All work shall conform to the latest editions of the following South African standards:

Part 3: Scope of Work

SANS 10100-1: The Structural Use of Concrete – Part 1: Design

SANS 10100-2: The Structural Use of Concrete – Part 2: Materials and Execution of Work

SANS 50197-1: Cement – Part 1: Composition, Specifications, and Conformity Criteria for Common Cements

SANS 1083: Aggregates for Concrete

8.4.3 Materials

8.4.3.1 Cement

Cement shall be a Portland cement conforming to SANS 50197-1, Types CEM I or CEM II.

8.4.3.2 Aggregates

Fine Aggregate: Clean, natural sand complying with SANS 1083.

Coarse Aggregate: Crushed stone or gravel complying with SANS 1083. The maximum nominal size shall not exceed 19 mm.

8.4.3.3 Water

Water used in the mixing of concrete shall be clean, free from harmful impurities, and comply with SANS 51008.

8.4.3.4 Admixtures

Admixtures may be used with approval by engineer and shall comply with SANS 50934-2.

8.4.4 Concrete Mix Design

8.4.4.1 Mix Proportions

The concrete mix shall be designed to achieve a minimum compressive strength of 25 MPa at 28 days.

The slump shall be 75-100 mm unless otherwise specified.

The water-cement ratio shall not exceed 0.50.

8.4.4.2 Trial Mix

A trial mix shall be conducted before production to confirm the mix design meets the specified strength and work ability requirements.

8.5.....STRUCTURAL STEEL

8.5.1 General

8.5.1.1 Scope

Part 3: Scope of Work

This specification outlines the requirements for the refurbishment of existing structural steel, including inspection, surface preparation, repair, and protective coating application.

8.5.1.2 Standards

All work shall conform to the latest editions of the following South African standards:

SANS 2001-CS1: Construction Works – Structural Steel work

SANS 1200 H: Structural Steel work

SANS 1090: Execution of Steel Structures and Aluminium Structures

SANS 121: Hot Dip Galvanized Coatings on Fabricated Iron and Steel Articles

8.5.2 Inspection and Assessment

8.5.2.1 Condition Assessment

Conduct a thorough visual inspection to assess the condition of the steel work, identifying areas of corrosion, damage, or deterioration.

Use non-destructive testing (NDT) methods, such as ultrasonic testing or magnetic particle inspection, to evaluate the extent of damage and structural integrity.

8.5.2.2 Documentation

Prepare a detailed report documenting the condition of the steel work, including photographs, diagrams, and recommendations for repair or replacement.

8.5.3 Surface Preparation

8.5.3.1 Cleaning

Remove all dirt, oil, grease, and other contaminants using suitable cleaning methods, such as solvent cleaning or high-pressure washing.

8.5.3.2 Rust and Scale Removal

Remove rust, mill scale, and old coatings using abrasive blast cleaning to achieve a surface profile conforming to SANS ISO 8501-1 Sa 2.5 or as specified.

8.5.3.3 Surface Inspection

Inspect the prepared surface to ensure it meets the required cleanliness and profile standards before proceeding with repairs or coating application.

8.5.4 Repairs

8.5.4.1 Steel Repair

Repair or replace damaged or corroded steel members as specified in the condition assessment report. Ensure all repairs are carried out using materials and techniques that restore the structural integrity of the steel work.

8.5.4.2 Welding

Perform welding in accordance with SANS 10144: Welding – Arc Welding of Structural Steel. Inspect welds using NDT methods to ensure quality and compliance with specifications.

8.5.5 Protective Coatings

8.5.5.1 Coating Selection

Select protective coatings based on the environmental conditions and service life requirements, conforming to SANS 1090-2.

8.5.5.2 Coating Application

Apply coatings in accordance with the manufacturer's instructions, ensuring adequate coverage and thickness. Use a stripe coat on edges, welds, and other areas prone to corrosion.

8.5.5.3 Coating Inspection

Inspect the coating for uniformity, adhesion, and thickness using appropriate testing methods such as dry film thickness gauges.

8.5.6 Quality Control

8.5.6.1 Inspection

Conduct regular inspections throughout the refurbishment process to ensure compliance with specifications and quality standards.

8.5.6.2 Testing

Part 3: Scope of Work

Perform tests as necessary, including adhesion tests and hardness tests, to verify the quality of repairs and coatings.

8.5.7 Tolerances

8.5.7.1 Alignment

Ensure all repaired and replaced members are aligned within the specified tolerances.

8.5.7.2 Surface Profile

Verify that the surface profile meets the specified standards to ensure effective coating adhesion.

8.6....DRY WALLING AND PARTITIONS

8.6.1 General

8.6.1.1 Scope

This specification covers the materials, installation, and performance requirements for the construction of drywall partitions in interior spaces.

8.6.1.2 Standards

All work shall conform to the latest editions of the following South African standards:

SANS 10400: The Application of the National Building Regulations

SANS 10155: Standard Test Method for Noise Insulation in Buildings

SANS 10173: The Installation of Drywall Partitioning

8.6.2 Materials

8.6.2.1 Gypsum Board

Type: Standard gypsum board for non-wet areas, or moisture-resistant board for wet areas, as specified.

Thickness: Minimum 12.5 mm unless otherwise specified.

Standard: Conforming to SANS 266.

8.6.2.2 Metal Framing

Studs and Tracks: Made from galvanized steel, minimum thickness of 0.5 mm, conforming to SANS 517.

Size: Typically 63 mm or 76 mm wide, depending on design requirements.

8.6.2.3 Jointing Materials

Part 3: Scope of Work

Joint Tape: Fiberglass mesh or paper tape suitable for drywall applications.

Joint Compound: Ready-mix or powder form compound conforming to SANS 10400-B.

8.6.2.4 2.4 Fasteners

Screws: Corrosion-resistant screws for securing gypsum board to metal framing.

Anchors: Appropriate anchors for fixing tracks to the floor and ceiling, conforming to SANS 10173.

8.6.2.5 Insulation (Optional)

Material: Mineral wool or fiberglass, depending on acoustic or thermal requirements.

Thickness: As specified for acoustic or thermal performance.

8.6.3 Installation

8.6.3.1 Preparation

Verify that the floor and ceiling structures are level and capable of supporting the partition.

Mark the layout of the partition on the floor and ceiling.

8.6.3.2 Framing

Install tracks securely to the floor and ceiling using appropriate fasteners at a maximum of 600 mm centers.

Insert studs vertically into the tracks at 600 mm centers, ensuring they are plumb and aligned.

8.6.3.3 Gypsum Board Installation

Attach Gypsum boards to the framing with screws at a maximum of 300 mm centers on the edges and 400 mm centers in the field.

Stagger joints between adjacent boards to enhance structural integrity.

8.6.3.4 Joint Treatment

Apply joint tape over all joints and corners.

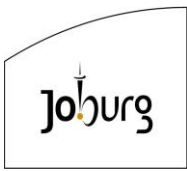
Apply joint compound over the tape and screw heads, ensuring a smooth finish. Allow to dry and sand as necessary.

8.6.3.5 Finishing

Apply a suitable primer to all exposed surfaces before painting or applying other finishes.

Ensure all surfaces are clean and free of dust before finishing.

8.6.4 Performance Requirements



Part 3: Scope of Work

8.6.4.1 Fire Resistance

Where required, partitions shall meet the fire resistance rating specified in SANS 10400-T.

8.6.4.2 Acoustic Performance

Partitions shall meet the specified sound transmission class (STC) ratings as per SANS 10155.

8.6.4.3 Structural Integrity

Partitions shall be installed to withstand normal service loads without deformation or damage.

8.6.5 Quality Control

8.6.5.1 Inspection

All work shall be subject to inspection by the Engineer or authorized representative to ensure compliance with this specification.

8.6.5.2 Testing

Conduct tests as necessary to verify compliance with fire and acoustic performance requirements in accordance with Agrément South Africa.

9 ELECTRICAL ENGINEERING – STANDARD SPECIFICATIONS

9.1 Scope of work

The specification covers the supply, installation, testing, commissioning, and handing over in a working condition and maintenance during the guarantee period of the general electrical installation of the Johannesburg Water mega warehouse. Scope of which includes new electrical installations necessary for the proper functioning of the warehouse.

The contractor is to provide for all the items required to provide a COMPLETE installation as indicated below under the Summary of the work.

9.2 Essence of the electrical installations

9.2.1 Installation electrician

Employ an installation electrician to plan control and supervise the day-to-day construction work activities on site with the associated responsibility. The installation electrician must also do full time quality control for the contractor on the site and sign the final compliance documentation for the project.

Enclose a copy of the 'Installation Electrician' certificates, address and his telephone number with the tender. Failure to provide this document disqualifies the tender.

9.2.2 Summary of the work

New installation

- Supply, install, test and commission LV supply cables to the new LV distribution board in the main warehouse and the overflow building as shown on the drawings.
- Supply, install, test and commission HDPE cable sleeves.
- Supply, install, test and commission the small power installation as shown on the drawings.
- Supply, install, test and commission the lighting installation as shown on the drawings.
- Supply, install, test and commission 110kVA, 380V, 50Hz automatic standby weather-proof generator set with a bund wall fuel tank and 1 000 litre reserve fuel tank.
- Supply, install, test and commission 20kVA, 380V, 50Hz uninterruptible power supply with 15 minutes backup time.
- Supply, installation, test and commissioning of a 60kWp photovoltaic solar system.

Part 3: Scope of Work

- Supply, install, test and commission earthing and lightning protection as shown on the drawings.
- Supply, install, test and commission a 10Gig fibre optic backbone network system.
- Supply, install, test and commission CCTV surveillance system.
- Supply, install, test and commission data network system.
- Supply, install, test and commission IP telephone system.
- Supply, install, test and commission intruder alarm system.
- Supply, install, test and commission access control system.
- Finishing and cleaning of the electrical installation.
- Provision of as-installed drawings and manuals, both operating and maintenance etc

9.3 Compliance with standards

All work to be performed in accordance with the following: -

Item No.	Reference Document Title	Year
1	SANS 204 – Energy efficiency in buildings	2011
2	SANS 10114-1: Part 1 Artificial Lighting of Interiors	2005
3	SANS 10389-1: Part 1 Artificial Lighting of Exterior Areas for Work and Safety	2003
4	SANS 10142-1: The Wiring of Premises, 2017 Edition 2.	2017
5	SANS 10292: Earthing of Low Voltage (LV) Distribution Systems.	2013
6	SANS 62052-21: Electricity Metering Equipment (A.C).	2020
7	NRS 048-4: Electricity Supply – Quality of Supply: Voltage Characteristics, compatibility levels, Limits and Assessment Methods.	2009
8	NRS 056-2: Service Distribution Boxes – Meter Kiosks and Distribution Kiosk	2012
9	Act 94 of 1995: Electricity Supply Act.	1995
10	Act 85 of 1993: Occupational Health and Safety Act.	1993

Standards referred to in this specification are the latest edition, including all amendments, published three calendar months or longer before the closing date of tenders.

The SANS specifications for general electrical installations takes preference in case of dispute, however the Chief Electrical Engineer from the reserves the right to intervene and his decision is final.

Part 3: Scope of Work

The electrical engineer will NOT entertain any claims for extra costs in respect of failure by the tenderer to comply with any of the above standards.

The project specification must be read in conjunction with the standard specifications referred to herein.

Any ambiguous or dubious wording must be cleared with the Engineer before work is started.

The wrong interpretation of the specification and/or drawings, resulting in alterations and/or additional costs, is solely the responsibility of the contractor.

9.4 Registration as an electrical contractor

Electrical contractor must be registered with the South African Electrical Contractors` Board, prior to the commencement of any service. This registration must be done at the relevant Regional Office. Submission of the registration details at the relevant office must be provided to the engineer prior to the commencement of any works.

The contractor must provide the following documents with the tender submission:

- (a) CIDB Grading of **6EB**
- (b) Installation Electrician certificate.
- (c) Electrical contractor's license.
- (d) Registration certificates and latest receipts of payment to the Workman's Compensation as required by the Workman's Compensation Act of 1941, as amended.

The contractor must enclose certified copies of the above documents (a) (b) and (c), with the tender submission. Failure to provide these documents disqualifies the tender.

9.5 Main electricity supply

The proposed Johannesburg Water Mega Store Warehouse will be supplied with electricity at 380V from the existing distribution board located in the adjacent workshop situated within the premises.

9.6 Materials

All material used in the execution of the works must be new, from fresh stock and of the highest quality available.

Products that are specified as mark bearing must bear the mark of the relevant standards body.

When so requested by the electrical engineer, provide evidence in form of delivery slip, certificates, test reports or other written proof that material or components comply with the standards laid down in this

Part 3: Scope of Work

specification. The engineering department reserves the right to have any suspect equipment or material tested and certified by an approved testing authority for compliance with the required standards. If the tests are successful the Department will bear the cost of the tests, however if the material or equipment fails the tests, the Contractor will bear the costs.

Any material or equipment that needs to be replaced must be replaced with the same quality material or equipment.

Take special care to ensure neatness in all parts of the installation. The equipment and material must be suitable for the purpose for which they are employed and the arrangement of the equipment must be of the best current practice.

Install only material and equipment manufactured in South Africa wherever possible.

9.7 Program

The Contractor must submit a detailed electrical Gantt chart programme within two weeks of being appointed or site establishment. The Engineer and the employer reserve the right to alter the programme to meet the priorities of the client. These amendments will be such that the Contractor will still be able to complete the electrical works within the tendered construction time. The completion date of the contract shall be as indicated at the site handover meeting or in the appointment letter.

The Contractor must submit a progress report on each monthly scheduled site meeting based on this original programme. The programme should indicate the procurement of materials for easy identification of long lead materials. A summary schedule indicating the main activities of the project shall also be submitted to the Engineer.

9.8 Low voltage cables

Supply, install, test and commission 600/1000V LV cables to distribute power from the adjacent workshop to the various distribution boards, as indicated in the drawings.

The cables will be installed in the ground, either directly laid in the soil, in cable sleeves, or suspended on cable trays installed in the roof.

Where cables are to be installed on cable trays, new cables must be of the ECC type.

9.9 Cable trenching

The Electrical Contractor is responsible for all trenching excavations unless specified to the contrary. Cable trench excavations shall comply with the following dimensions: -

Part 3: Scope of Work

LV cable trench detail

- Trench depth : 800mm
- Trench width : 500mm
- Bedding : 75mm
- Cable cover : 75mm
- Sifted Backfill : 300mm
- Compact soil : 150mm layers
- Cable tape marker depth: 300mm beneath
final ground level
- Cable markers : maximum spacing 30m on straight runs, and at
every turn, cable joint or slack position

9.10 Power skirting

The power skirting shall be mounted as a continuous surface skirting.

The skirting shall be fixed to the floor and walls with 4mm diameter cadmium plated screws and fisher plugs not exceeding an interval of 1,5m.

The type of power skirting shall be two compartment, two lid extruded steel product. The material of the skirting shall be all steel. The colour of the skirting shall be suit the colour of the wall unless otherwise stated by the Architect.

Conduit connections shall be done using glands.

A minimum of two 32mm conduits will be provided to the power section of the power skirting and a minimum of two 25mm conduits to the data and a minimum of two 25mm conduits to the telephone sections.

Power skirting will be linked with conduits to each section as described above where doors or passages break the skirting run.

Provide an earth wire across each section of the power skirting to ensure earth continuity of the power skirting body.

9.11 Cable support systems

The contractor is to provide the following cable support systems, as indicated on the drawings and in the standard specifications:

9.11.1 Heavy Duty Cable Ladder

Supply and install 150mm galvanized steel heavy-duty cable ladder as shown in the drawings. Install cable ladders on 40 mm x 40 mm channel bolted to the walls with M10 x 60mm anchor bolts.

Earth the cable supports with 16mm² bare stranded copper earth wire.

9.11.2 Heavy Duty Welded Wire Mesh

A heavy-duty wire mesh cable tray shall be used for support services in the routes as indicated on the drawing.

300mm wide will be used in the roof space area to accumulate all the services and route the services to the services cupboards and equipment locations.

150 wide will be used to route individual services to equipment.

9.11.3 P8000 & P9000 Wiring Duct

P8000 and P9000 wiring duct will be used in the roof space area to route LV wiring from local distribution boards to circuits and the ICT infrastructure. Conduits will connect to the P8000 and P9000 wiring duct to route the wiring to individual switches, socket outlets and ICT infrastructure.

All associated fittings, accessories and fixtures are to be factory manufactured and NOT to be manufactured on site by the contractor. All makeshift fittings will be rejected.

Wire all contacts and monitoring facilities to a terminal block at the back of the panel.

Should the isolator panel not be able to accommodate the equipment required for the current energy measurement, the contractor should consider the use of a summation transformer to provide an indication of these measurements on the main incomer. The engineer must approve the designs of all equipment to be provided before commencement of the actual work.

Wire all contacts and monitoring facilities to a terminal block at the back of the panel.

Part 3: Scope of Work

9.12 Wiring schedules

Item	Description	Cable Size	Earth Wire
1	Lighting	2.5mm ² PVC conductor	2.5mm ² PVC insulated earth conductor
2	Plugs	4.0 mm ² PVC conductor	4.0mm ² PVC insulated earth conductor
3	Extractor Fans	2.5mm ² PVC conductor	2.5mm ² PVC insulated earth conductor
4	Isolators	4.0, 6.0 & 10.0mm ² PVC	4.0, 6.0 & 10.0mm ² PVC insulated earth

9.13 FINAL CONNECTION WIRING SCHEDULES

Item	Description	Cable Size	Earth Wire
1	Lighting	1.5mm ² 3-core flexible PVC cable	Provided in cable
2	Extractor Fans	2.5mm ² 3-core flexible PVC cable	Provided in cable
3	Air Conditioner	2.5, 4.0 & 6.0mm ² 3 & 4-core	Provided in cable
4	Isolators	2.5, 4.0, 6.0 & 10.0mm ² 3 & 4-	Provided in cable

9.14 LIGHT SCHEDULE

All light fittings with diffuser shall have a UV stabilized polycarbonate diffuser and all light fittings shall come with a 5year warranty.

TYPE	DESCRIPTION
Type A	1 200mm long surface mounted open channel light fitting complete with 2x 23W, LED tubes, 2 150lumens per lamp, IP20 and electronic control gear.
Type AE	1 200mm long surface mounted open channel light fitting complete with 2x 23W, LED tubes, 2 150lumens per lamp, IP20, one hour emergency battery back-up and electronic control gear.
Type B	1 200mm long surface mounted watertight, steam proof and corrosion proof light fitting complete with 2x 23W, LED tubes, 2 150lumens per lamp, IP66 and electronic control gear.

Part 3: Scope of Work

TYPE	DESCRIPTION
Type BE	BE: 1 200mm long surface mounted watertight, steam proof and corrosion proof light fitting complete with 2x 23W, LED tubes, 2 150lumens per lamp, IP66, one hour emergency battery back-up and electronic control gear.
Type C	Surface mounted bulkhead light fitting complete with diecast LM6 aluminium powder coated housing, 4mm heat tampered safety front glass cover, 24W, LED lamp, 2 594 lumens, IP66, and electronic control gear.
Type CE	Surface mounted bulkhead light fitting complete with diecast LM6 aluminium powder coated housing, 4mm heat tampered safety front glass cover, 24W, LED lamp, 2 594 lumens, IP66, one hour emergency battery back-up and electronic control gear.
Type D	Surface mounted functional floodlight fitting c/w die-cast LM6 aluminium powder coated housing, 4mm heat tampered safety front glass cover, 79W LED lamp, 14 247 lumens, IP66 and electronic control gear.
Type H	High bay light fitting complete with 200W, LED lamp, 32 492lumens, IP67, 2m x 0.75mm ² 3Core Flex Cable, 5A Unswitched Socket Outlet, Plug Top and electronic control gear.
Type HE	High bay light fitting complete with 200W, LED lamp, 32 492lumens, IP67, 2m x 0.75mm ² 3Core Flex Cable, 5A Unswitched Socket Outlet, Plug Top, one hour emergency battery back-up and electronic control gear.

9.15 DISTRIBUTION BOARDS

Main distribution board properties (DB-MW)

- Type: Wall mounted surface mounted.
- Doors: Lockable
- Front panel: Hinged front panel (face plate) with pad lockable swing handles
- Colour: Electric Signal White

Sub distribution boards properties (DB-OW)

- Type: Lockable flush wall mounted
- Doors: Fitted with lockable doors
- Front panel: Hinged front panel (face plate) with pad lockable swing handles
- Colour: Electric Signal Red

The following distribution boards are to be installed in this contract as shown on the drawings:

- DB – MW Main Low Voltage Distribution Board with emergency power compartment.

Part 3: Scope of Work

- DB-OW Distribution Board in Overflow Warehouse with emergency power compartment.

Distribution boards must have aluminium electrical signage affixed to the distribution boards.

Distribution board doors must have a neat and professionally manufactured cut-out, with reinforced and properly finished edges, so that the main isolator of the distribution board can be switched without opening the door in case of emergency. Distribution boards must be lockable, and padlocks must be supplied with the distribution board. The design of the locking mechanisms and cut-out forms part of this project specifications.

Two spare / additional 25mm dia. and three spare / additional 20mm diameter conduits must be installed to all distribution boards and are to be terminated onto a suitably sized galvanized draw box with a cover plate installed within the open ceiling roof space.

The main circuit breaker for the generator distribution board must be adjustable to trip at lower currents than the maximum rating.

The main distribution board and sub distribution board are to be fitted with a digital display kilowatt-hour meter with data storage and retention (with battery back-up). Both kilowatt-hours and maximum demand must be measured for the main incoming supply and the generator supply. Phase and neutral currents must also be measured. Provide battery backed up data storage and retention.

Install surge arrestors for the main incoming supply and in all distribution boards that complies with SANS 10142-1:2017, Edition 2.

9.16 Standby generator set

A 200KVA, 400A, 3phase weatherproof, automatic standby generator set complete with a self-bunded diesel fuel base tank, an acoustic canopy, and all associated accessories will be provided. The unit shall be supplied in accordance with the SANS requirements.

Output and voltage.

No load voltage	:	400/231 Volt
Rating	:	200KVA
Power at 0,8 power factor	:	160KW
Frequency	:	50Hz
Fault level	:	10KA
Power factor	:	0.8 lagging

Part 3: Scope of Work

Height above sea level	:	1800meter
Maximum ambient temperature	:	35°C
Maximum ambient humidity at		
lowest temperature	:	60%
Fuel autonomy at nominal (prime) power:		7 hours

9.17 Uninterruptible power supply system (U)

A 20KVA, 30A, 3phase uninterruptible power supply system with 15minutes battery back-up, and all associated accessories will be provided. The unit shall be supplied in accordance with the SANS requirements.

Output and voltage.

No load voltage	:	400/231 Volt
Rating	:	20KVA
Power at 0,8 power factor	:	16KW
Frequency	:	50Hz
Fault level	:	6KA
Power factor	:	0.8 lagging
Height above sea level	:	1800meter
Maximum ambient temperature	:	35°C
Maximum ambient humidity at		
lowest temperature	:	60%
Battery autonomy at nominal (prime) power	:	15 minutes

9.18 Earthing system

The earthing shall comply with SANS 10142 and NRS034.

The following are acceptable types of Earth Electrodes.

Part 3: Scope of Work

- Crows Foot Earth

The contractor will be responsible for the complete design of the earthing system and will issue a certificate of compliance by a reputable specialist in the field. The contractor will be required to conduct initial site resistivity measurements and to base the design of the earthing system on these tests. The engineer must witness all tests conducted. All designs for the earthing system must be approved by the engineer prior to commencement of construction.

The earth system shall be separate for the MV and LV networks by the use of the crow's foot earthing arrangement. Provide a copper earth bar in DB – MW as well as the distribution board cubicles. Provide a link arrangement between the MV and LV earth networks for interconnecting the two.

Electrode holes are to be drilled to either 1.2 metre or 3 metre depth to suit the electrode size and filled with a conductive slurry mixture. Electrodes are to be either 900mm or 2400mm in length.

Earth the building in accordance with Gauteng Provincial Government Standard Specifications for General Electrical installations.

Earth the distribution boards to the following:

- Main cold water pipe
- Roof
- Steel trusses
- Water heating system
- Cable trays and wire mesh support systems

Install earth bars connected to a local earth system with a value of less than 5 ohm in the following locations and connected to the earth systems with a 70mm² insulated earth cable:

- Server room
- Equipment rooms

Submit an earth test certificate issued by an accredited person from an approved company.

9.19 Lightning protection system

Install the lightning protection in terms of the Standard Specifications and SANS norms.

The down conductors must be spaced at regular intervals around the buildings and connected to the common earth system.

Arrange with the Engineer to witness all tests and measurements after completion of installation.

Submit a certificate of compliance issued by an accredited person from an approved company.

9.20 Fibre optic network

The entire warehouse will be covered by an enterprise grade network system to accommodate adequate wireless access ports, wired data points, VOIP telephones and CCTV cameras for staff.

4 Core, OM4, Multi-mode Fibre cabling shall be used for the fibre backbone to connect server core switches in the main network cabinet in the security control server room to field access switches in network cabinets in other areas.

The main network cabinet in the security server room will be a lockable 42U floor standing cabinet.

12U lockable cabinets shall be used in the overflow block. These cabinets will be wall mounted, supported by brackets, and installed just below ceiling height. The field access switches for the mega warehouse will be housed in the main network cabinet in the security/control server room.

The 10G LAN backbone shall implement a mesh network topology with two server core switches installed in the main server room (42U rack). The two server core switches shall be trunked and aggregated to provide fault tolerance and high-speed links between them. This also provides redundancy in the event of one of the server core switches being faulty or going down.

Each 10G (i.e., the up-link side shall be 10G) field access switch in the mega warehouse will be connected to the two server core switches using 4 core, OM4 multimode fibre.

3kVA U (uninterruptible power supply) will be installed in the server room with sufficient capacity to supply the equipment in the server room (in the 42U cabinet) and the equipment in the security control room (except the 55-inch monitor) for one hour. Note the requirement for POE (power over Ethernet) switches, CCTV cameras, wireless access points and VOIP telephones. All the ICT equipment in the security/control room will thus be supplied from the U in the server room.

Install an inline rack mounted 1.5kVA U in all 12U network cabinets with one or more 48port switches (installed in overflow block). Supply an inline rack mounted 800VA U for 24 port and 8 port network switches. Note the requirement for POE (power over Ethernet) switches, CCTV cameras, wireless access points and VOIP telephones.

U batteries should not release any corrosive or combustible gases.

A clearly identified isolator for both the incoming supply to the U and for the outgoing supply from the U in the security/control server room next to the U will be installed.

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Fibre optic and other cabling shall be installed in conduit, sleeves, P9000 covered galvanized trunking in ceilings and power skirting as required.

Fibre optic and other cables and conductors straining around corners, especially corners with sharp edges, in galvanized trunking will not be accepted. Sharp edges will be covered with a suitable insulating material.

9.21 Wireless access network

Wireless access points shall be installed in mega warehouse and overflow building. These areas will be covered by an appropriate number of wireless access points.

All wireless access points (and network switches, CCTV cameras and VOIP phones) shall be of the POE (power over internet) type.

Flush with the ceiling wireless access points is preferred to the types that clip onto the tees of suspended ceilings.

Suspended ceiling panels (1200mm x 600mm) will, if required due to the weight of the wireless access points, be reinforced with wooden supports (brandering may be fit for this purpose) when fitting wireless access points that are not supported by the suspended ceiling tees. The wooden supports shall be cut to almost the same width as the suspended ceiling panels to rest on the suspended ceiling tees. The wireless access points shall be screwed/bolted onto the wooden supports.

Yellow Cat 6a cabling shall be used to connect wireless access points, CCTV cameras (blue Cat6a), data points (grey Cat6a), and VOIP telephone points (green Cat6a) to the field access switches.

Colour coded patch leads shall be used when patching data points in the cabinets to differentiate between data / VOIP / CCTV camera / wireless access points.

9.22 Wired network data points

Grey Cat 6a cabling will be used to connect wired data points to the field access switches, also CCTV cameras (blue Cat6a), wireless access points (yellow Cat6a), and VOIP telephone points (green Cat6a).

The wired data point network will be implemented with Cat6a cabling which shall be installed in conduit, sleeves, P9000 covered galvanized trunking in ceilings or power skirting as required. See note above about sharp edges in galvanized trunking.

Colour coded patch leads shall be used when patching data point in the cabinets to differentiate between data / VOIP / CCTV camera / wireless access points.

9.23 VOIP telephone system

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Green Cat 6a cabling will be used to connect VOIP telephone points (also CCTV cameras (blue Cat6a), wireless access points (yellow Cat6a), and wired data points (grey Cat6a) to the field access switches.

The telephone system will be able to accommodate 2 outgoing lines (Telkom lines).

In the event that the network or PABX go down, the PABX shall automatically switch through a Telkom line to the main reception and the manager's office so that these phones still function.

All VOIP phones (and network switches, wireless access points and CCTV cameras) will be of the POE (power over internet) type.

Colour coded patch leads will be used when patching data point in the cabinets to differentiate between data / VOIP / CCTV camera / wireless access points in the patch cabinets.

9.24 Closed circuit television (CCTV) system

Contractor to indicate compliance or Non-Compliance on the following.

Closed Circuit Television Surveillance System:	
The CCTV system must keep a record of all authorised access as well as activities at the facilities where the system is installed.	COMPLY or DO NOT COMPLY
The CCTV system must also keep a record of any unauthorised access and activities in the facilities and must generate alarm and record events before, during and after any incident that requires response.	COMPLY or DO NOT COMPLY
The CCTV system must be integrated to the Access Control system and must also serve as backup evidence gathering system that will enable Johannesburg Water to effectively investigate any breach in the access of the facility.	COMPLY or DO NOT COMPLY
To this extent, the CCTV system must capture the facial features of every person that is granted access to the facility with a quality that is able to provide absolute identification of the person in question. This quality is known as forensic quality facial identification.	COMPLY or DO NOT COMPLY
Forensic quality facial identification cameras must be installed at all entry and exit points of the facility.	COMPLY or DO NOT COMPLY
The normal routes that people follow in the facilities such as passages and foyers will be covered by static camera coverage that will enable track and trace the movement of any person to all rooms/facilities within the building or premises.	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

This will allow the Johannesburg Water to connect the image captured at any entry point to the actions of the person under surveillance at any point in the building by means of track and tracing the movement of the person from the entry point to any point in the facility where identity of the person may be in question. CCTV coverage must be provided as part of the system specifically to cover access routes to the warehouse. This CCTV footage must be displayed live at all times in the community service centre to enable JOHANNESBURG WATER members on duty to have situational awareness of persons approaching the warehouse.	COMPLY or DO NOT COMPLY

Image Analytics:	
Johannesburg Water CCTV systems are required to make effective use of image analytics. Analytics available in the systems must include the following as a minimum:	
Intelligent Motion Detection able to minimise false alarms in open spaces where wind induced motion of plants etc. is present.	COMPLY or DO NOT COMPLY
Facial Recognition with a capability to generate an alert to security personnel when specific persons enter or attempt to enter the facility.	COMPLY or DO NOT COMPLY
Automatic Number Plate Recognition.	COMPLY or DO NOT COMPLY
The CCTV system used must have a set of well-developed image analytics capabilities. The system must allow for the addition of custom image analytics modules that the Johannesburg Water may source or may self-develop.	COMPLY or DO NOT COMPLY

CCTV Quality Levels:	
The Johannesburg Water defines for purposes of this specification the following 4 quality levels:	
Monitor: Images conforming to this quality level must allow Johannesburg Water to follow the motion of all extremities of the human body and must enable Johannesburg Water to identify at least race and gender of persons appearing in the images. The surveillance material must at least provide 12 frames per second of images that will enable motion to be followed fluently and must provide at least 250 pixels in height over the average length of a person (1.6 Meter).	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

Recognition Quality: Images conforming to recognition quality must achieve facial recognition on the standard test faces of the ROTAKIN CCTV evaluation target. The system must capture the facial features of person with adequate fidelity to achieve better than 97% recognition of the ROTAKIN faces.	COMPLY or DO NOT COMPLY
Forensic Identification Quality: Is defined as an image in which micro level features on the face, which includes scars, moles, wrinkles and other facial marks are effectively captured. This level of quality will enable identification of an individual to the degree that all reasonable doubt over identity of the individual is removed.	COMPLY or DO NOT COMPLY
Identification of specified Items: Is defined as a quality level engineered in a specific project for a specified purpose. Examples would be the optical capturing of the numbering and writing on sealed evidence containers such as the evidence bags.	COMPLY or DO NOT COMPLY

Private Spaces within the secured area:	
Within the secured area, private spaces such as ablution facilities and offices where sensitive materials are not handled will not be covered. The camera coverage must however be of adequate quality to ensure facial recognition of persons entering or leaving these private and identification of objects that are carried in and out of these areas.	COMPLY or DO NOT COMPLY

Storage of CCTV Data	
The CCTV data stored is required to facilitate investigation of incidents that occur in the Johannesburg Water facilities. Incidents may be identified immediately or may only be identified later. Storage of CCTV data in the case of buildings and premises is required as a norm for at least six weeks or if otherwise specified.	COMPLY or DO NOT COMPLY
Storage must be designed such that quality is not compromised. Footage quality must be stored in the same quality such that review at any later date will achieve the same operational result.	COMPLY or DO NOT COMPLY
Network:	
The architecture design and implementation of the system must have no negative impact on the existing Johannesburg Water data network within the building/facility.	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

To achieve this it is recommended that the CCTV and Access Control System must be installed on an independent separate network infrastructure.	COMPLY or DO NOT COMPLY
This network must be specifically designed to deliver transmission services that are optimised for its purpose.	COMPLY or DO NOT COMPLY
This network must provide low latency, specifically from Pan Tilt Zoom camera feeds, such that operators are not impeded in operational efficiency through undesirable networking phenomena.	COMPLY or DO NOT COMPLY
Remote access to the CCTV and Access Control System must be achieved by a single port connected to the Johannesburg Water internal Local Area Network (LAN) in the building.	COMPLY or DO NOT COMPLY
This port must be connected via a computer that provides access control to the CCTV and Access Control management system. The Video Management System must host the profiles of the users that are granted remote access.	COMPLY or DO NOT COMPLY
Different profiles must be created for different levels of remote access to the system. Control room system operator/monitor users may have only viewing rights, whereas Johannesburg Water technical personnel may have setup and configuration rights.	COMPLY or DO NOT COMPLY
The network transmission capacity must be designed with the transmission capacity equal to the maximum data rate that can be generated with all cameras in the systems actively streaming at maximum data rate level simultaneously.	COMPLY or DO NOT COMPLY

Control Room:	
The control room to be assembled at each site will act as the monitoring point where security personnel will monitor the CCTV and Access Control data on a 24-hour basis and where necessary, react to emergency situations.	COMPLY or DO NOT COMPLY
The security system in the control room must be able to give the security personnel control of the PTZ camera within the system to be able to follow incidents and provide guidance to security personnel out in the terrain.	COMPLY or DO NOT COMPLY
A minimum of 40" full HD screens mounted in a video wall configuration must be installed to display all cameras within the system. The number of active video feeds enabled will determine the number of screens required.	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

All cameras installed as part of the system must be visible on the video wall at all given times.	COMPLY or DO NOT COMPLY
The control room must be equipped with all of the necessary equipment that renders a fully functional control room environment such as Video Management software (VMS), servers, cables, electricity supply systems, cooling/air conditioning systems and back-up power supply systems.	COMPLY or DO NOT COMPLY

GENERAL PHYSICAL REQUIREMENTS	
Environmental conditions	
All equipment shall be designed for application in 'special' environmental conditions as follows	
Ambient air temperature: -25 °C to +55 °C (installed indoors); or -25 °C to +70 °C (installed outdoors, within enclosures).	COMPLY or DO NOT COMPLY
Altitude: < 2 500 m	COMPLY or DO NOT COMPLY
Pollution: Location in urban areas with industrial activities and without special precautions to minimize the presence of sand or dust Relative humidity (24h average): 98%	COMPLY or DO NOT COMPLY
All outside equipment Including fasteners and supports should be corrosion resistant and appropriate for the environment on site.	COMPLY or DO NOT COMPLY
After fabrication, metal surfaces including doors and removable covers shall be prepared and finished with corrosion protection.	COMPLY or DO NOT COMPLY
All nuts, bolts and washers use for the construction to be stainless steel. Screws can be cadmium plated.	COMPLY or DO NOT COMPLY
Further environmental protection may be needed	COMPLY or DO NOT COMPLY
Convection cooled (fan-less) equipment are strongly preferred. If fans are used, they shall be speed controlled and the electronics shall be isolated and conformal coated to protect against dust ingress.	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

General Electrical Requirements	
The expected life of equipment under conditions specified shall be a minimum of 5 years.	COMPLY or DO NOT COMPLY
All power cable shall be appropriately sized to ensure voltage dro along cable runs remain within the operating specifications of the equipment being powered.	COMPLY or DO NOT COMPLY
All equipment shall be effectively protected against overvoltage due to lighting strikes or switching surges by strategically placed surge arrestors	COMPLY or DO NOT COMPLY
Cable selection and routing shall always be done in such a way that operation of equipment is not affected by electrical interference. This may be achieved by separating power and communications cables, shielding of cables, or a combination of the two.	COMPLY or DO NOT COMPLY
Equipment shall not be affected by electrostatic discharges that are applied directly to the equipment or to metal objects in the proximity of the equipment: All electronic equipment shall be a class 2 device as specified in IEEE 1613-2009, 8 Electrostatic discharge tests	COMPLY or DO NOT COMPLY

Cable routes in equipment rooms	
Auxiliary power cables shall be laid in the control room power rack, away from communication cables. No conduit is needed on the rack.	Requirement
Community cables should use communications racks if available. No conduit is needed on the rack.	OMMO
Where security cables are routed along the walls, they shall be in metal or plastic conduit.	Requirement
Auxiliary power and communication cables shall be in separate conduit.	Requirement
Where possible, security cables shall not be routed in the ceiling.	Requirement
If fibre optic leads are used, they should be protected using Sprague tubing when entering and exiting cable trays or panels.	Requirement
Regional or site-specific requirements may supersede the above cable route requirements.	Requirement

Part 3: Scope of Work

Outdoor Cables and Trenching	
Security cable should share control cable trenches where possible, where this is not possible, security cable trenches shall be dug.	Requirement
The security cables shall enter the control room through the same path as control cables.	Requirement
Security cable trenches shall be a minimum 0,5 m deep	Requirement
All cables shall be armoured or alternatively laid in appropriately sized plastic / bosal conduit (whether in cable trenches or dedicated security trenches. The appropriate bends and connectors must be used for the conduit, according to manufacturer's instructions.	Requirement
Security systems communication cables and auxiliary power cables shall not be laid in the same conduit unless using fibre communication or DC power.	Requirement
Drilled holes in junction boxes shall be kept to a minimum and shall be appropriately sealed to prevent water ingress.	Requirement
Care shall be taken when working with fibre optic cable to ensure the fibre is not damaged during installation or maintenance.	Requirement
After the cables have been laid, the trenches must be backfilled with the original soil in layers not exceeding 300mm and properly compacted. Once the backfill is completed, the stone shall be replaced appropriately.	Requirement
Security Cabinet	
The security cabinet/panel shall contain all the control equipment of the intruder detection and the surveillance system (network / digital video recorder (NVR), communication equipment, public address (PA) etc.). The cabinet shall be housed within a suitable access-controlled equipment room.	COMPLY or DO NOT COMPLY
Cabinet shall be a freestanding swing frame panel or a freestanding server cabinet.	COMPLY or DO NOT COMPLY
Cabinet shall be designed so as to limit dust ingress which could affect effective operation of equipment.	COMPLY or DO NOT COMPLY
All points of cable entry shall be through glands so as to secure the cables.	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

Access to the inside of the cabinet shall be restricted and controlled by means a physical lock to which only authorized security personnel from Johannesburg Water shall have access. Cabinet shall be alarmed for tampering and remain armed when main alarm system is disarmed. This is subject to regional requirements.	COMPLY or DO NOT COMPLY
Cabinet design shall take into consideration airflow and heat distribution. Equipment shall be laid out such that units that generate the most heat is at the top.	COMPLY or DO NOT COMPLY
There shall be a dedicated Aux power supply distribution module with a suitably sized incomer isolator and suitably sized load MCBs per piece of equipment.	Requirement
The incomer supply DB MCB for this module must be correctly sized to protect the incomer cable in order to prevent nuisance tri.	Requirement
Cables shall be neatly routed in trunking.	Requirement
Cable ties or similar shall be used for cable management.	COMPLY or DO NOT COMPLY
Where possible equipment in the security cabinet shall be 19-inch rack	COMPLY or DO NOT COMPLY
Equipment or connection accessed regularly shall be accessible from the front of the panel or shall be wired to a terminal rack accessible from the front.	COMPLY or DO NOT COMPLY
Equipment shall be suitably earthed to the cabinet, and the cabinet shall be earthed to the main earthing system of the building/facility.	COMPLY or DO NOT COMPLY

Backup Power Supply	
The backup power must provide power to all identified systems for at least is 12 hours.	COMPLY or DO NOT COMPLY
Johannesburg Water requires a complete backup power system made up of Hybrid Inverters (5KVa/ 8KVa) with solar capabilities (MPPT), Lithium Iron phosphate Batteries of at least 5.12 KWh. As per the attached specification 5.4.8. The backup system must allow for capacity expansion if and when required. The system must be of similar quality to the following brands: ✓ Inverters: Victron, Mecer, ACDC, Sunsynk, Deye etc. With at least a 5-year guarantee. ✓ Lithium Iron phosphate Batteries: Hubble, Dyness, Sunsynk, N energy, Volta, Shoto etc. With at least a 10-year guarantee.	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

The system shall have remote Management connection capabilities not limited to the following interfaces: RJ 45, RS 232, Wi-Fi etc.	COMPLY or DO NOT COMPLY
The system must be supplied with all accessories for a complete installation including all circuit breakers, cabling, Distribution board (DB) with change-over, DC fuses with holders, buss-bar controller and mounting brackets to allow for a fully operational system.	COMPLY or DO NOT COMPLY
The system must be installed in accordance with applicable SANS.	COMPLY or DO NOT COMPLY
The Johannesburg Water requires that the backup power system provides power to the following essential areas and or equipment: ✓ Network server room ✓ Plug point for the desktop computer ✓ CCTV and access control systems including displays.	COMPLY or DO NOT COMPLY

220V AC Supply	
The security system shall be powered by 220V AC supplied from the site's AC supply with an appropriately sized backup Power Supply.	COMPLY or DO NOT COMPLY
Any power backup system used for the CCTV and Access Control system including essential systems as identified by the Johannesburg Water shall provide as a minimum backup for the time specified above.	COMPLY or DO NOT COMPLY
The system shall have a power failure intruder detection indication that shall be sent through to the security control room should the AC supply be interrupted.	COMPLY or DO NOT COMPLY
The system may have an additional power failure alarm indication that shall be sent through to Johannesburg Water network control should the AC supply be interrupted.	COMPLY or DO NOT COMPLY

SYSTEM COMPONENTS	
Video Management Software (VMS)	
The VMS should support a wide range of IP cameras from various manufacturers to ensure seamless integration with future camera networks.	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

The system shall offer an automatic camera discovery feature for quick and hassle-free camera setup.	COMPLY or DO NOT COMPLY
The VMS shall have an easy-to-use and user-friendly interface for efficient navigation and camera management.	COMPLY or DO NOT COMPLY
Must have embedded support for different user profiles and permissions to restrict access based on user responsibilities.	COMPLY or DO NOT COMPLY
Multi-Platform Access: The VMS should be accessible from various platforms, including web browsers, desktop applications, and mobile devices.	COMPLY or DO NOT COMPLY
The VMS shall allow simultaneous live monitoring of multiple camera feeds in a multi-screen view.	COMPLY or DO NOT COMPLY
The VMS shall have seamless playback of recorded video footage with options for fast-forward, rewind, and frame-by-frame analysis.	COMPLY or DO NOT COMPLY
Shall support continuous 24/7 video recording from all cameras.	COMPLY or DO NOT COMPLY
Shall have efficient video compression (e.g., H.264, H.265) to optimize storage utilization without compromising video quality.	COMPLY or DO NOT COMPLY
The VMS shall offer flexible storage management options, including support for network-attached storage (NAS) and network video recorders (NVRs).	COMPLY or DO NOT COMPLY
Must have built-in redundancy and failover mechanisms to ensure data integrity and to prevent data loss.	COMPLY or DO NOT COMPLY
The VMS shall have configurable event triggers based on motion detection, audio detection, and other analytics features.	COMPLY or DO NOT COMPLY
Shall be equipped with real-time email or push notifications to designated personnel in case of security breaches or predefined events.	COMPLY or DO NOT COMPLY
The VMS shall be scalable to accommodate future expansion in terms of camera additions and storage requirements.	COMPLY or DO NOT COMPLY
The VMS shall have the capability to integrate with third-party security systems, access control, and alarm systems.	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

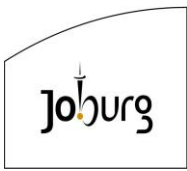
The VMS shall have robust security measures, including encryption, user authentication, and secure communication protocols, to protect against unauthorized access and data breaches.	COMPLY or DO NOT COMPLY
The VMS shall have video analytics features, such as people counting, object detection, and facial recognition.	COMPLY or DO NOT COMPLY

Network Video Recorder (NVR) for Small to Medium size CCTV Installations	
The Network Video Recorder (NVR) required shall have a minimum of 32 camera channels.	COMPLY or DO NOT COMPLY
Shall support for H.264 or H.265 video compression to ensure efficient storage utilization.	COMPLY or DO NOT COMPLY
The NVR shall support various recording resolutions, including at least Full HD (1080p) and preferably higher resolutions.	COMPLY or DO NOT COMPLY
Must be capable of accommodating multiple hard drives with sufficient storage capacity for continuous video recording and data retention as per industry standards.	COMPLY or DO NOT COMPLY
The NVR shall support Power over Ethernet (PoE) to simplify camera installation and reduce cabling complexity.	COMPLY or DO NOT COMPLY
Shall have built-in features or support for remote access, allowing authorized users to view live streams and playback recorded footage via web browsers or dedicated mobile applications.	COMPLY or DO NOT COMPLY
The NVR shall have an intuitive and user-friendly interface for easy navigation, configuration, and system management.	COMPLY or DO NOT COMPLY
Must have compatibility with a wide range of Internet Protocol (IP) cameras from different manufacturers.	COMPLY or DO NOT COMPLY
The NVR shall have multiple network ports for seamless integration into existing network infrastructure.	COMPLY or DO NOT COMPLY
Shall have video analytics features such as motion detection, line crossing, and intrusion detection.	COMPLY or DO NOT COMPLY
Integration with external alarm systems and the ability to trigger alerts and notifications in case of suspicious activities.	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

Support for RAID (Redundant Array of Independent Disks) configurations and automated data backup options to ensure data integrity and continuity in case of hardware failure.	COMPLY or DO NOT COMPLY
Scalability: A system that allows for future expansion in case camera requirements grow.	COMPLY or DO NOT COMPLY

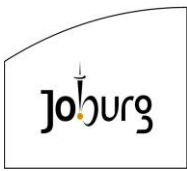
Servers for Large CCTV Installations	
Number of Camera Channels Supported: Minimum 80 camera channels per server.	COMPLY or DO NOT COMPLY
Processing Power: High-performance server hardware with multi-core processors and sufficient RAM to handle video processing and storage demands efficiently.	COMPLY or DO NOT COMPLY
Video Management Software: Robust video management software that can handle the concurrent streaming and recording of multiple camera feeds.	COMPLY or DO NOT COMPLY
Storage Capacity: Capable of accommodating multiple high-capacity hard drives or a scalable storage solution to cater to continuous video recording and data retention as per industry standards.	COMPLY or DO NOT COMPLY
Redundancy and Failover: Built-in redundancy features, such as RAID configurations and redundant power supplies, to ensure data integrity and minimize downtime in case of hardware failures.	COMPLY or DO NOT COMPLY
Network Connectivity: Multiple network ports with high-speed connectivity to support the bandwidth requirements of numerous cameras and remote access.	COMPLY or DO NOT COMPLY
Remote Access: Built-in features or support for remote access, allowing authorized users to view live streams and playback recorded footage via web browsers or dedicated mobile applications.	COMPLY or DO NOT COMPLY
Scalability: The ability to expand storage and processing capabilities as camera requirements may grow in the future.	COMPLY or DO NOT COMPLY
Video Analytics: CPU/GPU capabilities to cater for video analytics features such as motion detection, people counting, and facial recognition to enhance security and efficiency.	COMPLY or DO NOT COMPLY
User Management: Advanced user management features, including role-based access control, to regulate user permissions and ensure system security.	COMPLY or DO NOT COMPLY



Part 3: Scope of Work

Data Backup: Automated data backup options to ensure data safety and recovery in case of unexpected events.	COMPLY or DO NOT COMPLY

Types of Cameras Required	
PTZ Camera	
PTZ Camera with minimum 23x Optical Zoom	COMPLY or DO NOT COMPLY
Resolution: Minimum 2 Megapixels (MP)	COMPLY or DO NOT COMPLY
Lens: Vari-focal lens with adjustable focal length	COMPLY or DO NOT COMPLY
Field of View: Adjustable based on focal length	COMPLY or DO NOT COMPLY
Pan Range: 360 degrees continuous rotation	COMPLY or DO NOT COMPLY
Tilt Range: -90 to +90 degrees	COMPLY or DO NOT COMPLY
Pre-set Positions: 150 programmable pre-set positions	COMPLY or DO NOT COMPLY
Infrared (IR) Range: Minimum 100 meters	COMPLY or DO NOT COMPLY
Mounting: Ceiling mount or pole mount	COMPLY or DO NOT COMPLY
Pan-Tilt-Zoom functionality, Pre-set tours, High-speed tracking	COMPLY or DO NOT COMPLY
Minimum IP66 weatherproof rating,	COMPLY or DO NOT COMPLY



Part 3: Scope of Work

Minimum Illumination: 0.01 lux for clear images in low-light conditions	COMPLY or DO NOT COMPLY
Image Enhancement: Wide Dynamic Range (WDR) for enhanced image quality in high-contrast scenes	COMPLY or DO NOT COMPLY
Video Compression: H.264 and H.265 video compression for efficient storage and transmission of video footage	COMPLY or DO NOT COMPLY
Frame Rate: minimum of 30 frames per second (f) for smooth video playback	COMPLY or DO NOT COMPLY
ONVIF Profile S	COMPLY or DO NOT COMPLY
Power: PoE (Power over Ethernet) or 24VDC/24VAC power options	COMPLY or DO NOT COMPLY

Indoor Dome	
Indoor Mini Dome Camera	
Resolution: High Definition (HD), minimum 2MP	COMPLY or DO NOT COMPLY
Lens: Fixed lens with a wide-angle view	COMPLY or DO NOT COMPLY
Field of View: Minimum 90 degrees	COMPLY or DO NOT COMPLY
Mounting: Ceiling mount	COMPLY or DO NOT COMPLY
Wide Dynamic Range (WDR)	COMPLY or DO NOT COMPLY
Minimum IP66 weatherproof rating,	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

Minimum Illumination: 0.01 lux for clear images in low-light conditions	COMPLY or DO NOT COMPLY
IR Range: Built-in infrared (IR) LEDs with a range of 30 meters for night vision	COMPLY or DO NOT COMPLY
Video Compression: H.264 and H.265 video compression for efficient storage and transmission of video footage	COMPLY or DO NOT COMPLY
Frame Rate: 30 frames per second (f) for smooth video playback	COMPLY or DO NOT COMPLY
ONVIF Profile S	COMPLY or DO NOT COMPLY
Power: PoE (Power over Ethernet) or 12V DC power options	COMPLY or DO NOT COMPLY

4.4.3 Outdoor Dome	
Outdoor Dome Camera shall have a Vari-focal Lens	COMPLY or DO NOT COMPLY
Resolution: High Definition (HD), minimum 2MP	COMPLY or DO NOT COMPLY
Lens: Vari-focal lens with adjustable focal length	COMPLY or DO NOT COMPLY
Field of View: Adjustable based on focal length	COMPLY or DO NOT COMPLY
Infrared (IR) Range: Minimum 30 meters, IR-cut filter	COMPLY or DO NOT COMPLY
Mounting: Wall mount and/or ceiling mount	COMPLY or DO NOT COMPLY
Minimum IP66 weatherproof rating	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

Minimum Illumination: 0.01 lux for clear images in low-light conditions	COMPLY or DO NOT COMPLY
IR Range: Built-in infrared (IR) LEDs with a range of 30 meters for night vision	COMPLY or DO NOT COMPLY
Image Enhancement: Wide Dynamic Range (WDR) for enhanced image quality in high-contrast scenes	COMPLY or DO NOT COMPLY
Video Compression: H.264 and H.265 video compression for efficient storage and transmission of video footage	COMPLY or DO NOT COMPLY
Frame Rate: 30 frames per second (f) for smooth video playback	COMPLY or DO NOT COMPLY
ONVIF Profile S	COMPLY or DO NOT COMPLY
Power: PoE (Power over Ethernet) or 12V DC power options	COMPLY or DO NOT COMPLY

Bullet Cameras	
Bullet Camera with Vari-focal Lens:	COMPLY or DO NOT COMPLY
Resolution: High Definition (HD), minimum 2MP	COMPLY or DO NOT COMPLY
Lens: Vari-focal lens with adjustable focal length	COMPLY or DO NOT COMPLY
Field of View: Adjustable based on focal length	COMPLY or DO NOT COMPLY
Infrared (IR) Range: Minimum 30 meters with IR-cut filter	COMPLY or DO NOT COMPLY
Mounting: Wall mount or pole mount	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

Minimum IP66 weatherproof rating	COMPLY or DO NOT COMPLY
Image Enhancement: Wide Dynamic Range (WDR) for enhanced image quality in high-contrast scenes	COMPLY or DO NOT COMPLY
Video Compression: H.264 and H.265 video compression for efficient storage and transmission of video footage	COMPLY or DO NOT COMPLY
Frame Rate: 30 frames per second (f) for smooth video playback	COMPLY or DO NOT COMPLY
ONVIF Profile S	COMPLY or DO NOT COMPLY
Power: PoE (Power over Ethernet) or 12V DC power options	COMPLY or DO NOT COMPLY
360 Degree Fisheye	
Image Sensor: High-resolution image sensor for clear and detailed video capture	COMPLY or DO NOT COMPLY
Lens: Panoramic fisheye lens to provide a full 360-degree field of view without any blind spots.	COMPLY or DO NOT COMPLY
Video Resolution: High-definition video resolution minimum 5MP to ensure clear and sharp images.	COMPLY or DO NOT COMPLY
Video Compression: Support for efficient video compression formats like H.264 or H.265 to optimize storage usage.	COMPLY or DO NOT COMPLY
Frame Rate: At least 25 frames per second	COMPLY or DO NOT COMPLY
Built-in Microphone: The camera should have an integrated microphone to capture audio within the camera's vicinity.	COMPLY or DO NOT COMPLY
Audio Compression: Support for audio compression formats to maintain audio quality while minimizing data usage.	COMPLY or DO NOT COMPLY
Infrared (IR) Illumination: Built-in IR illuminators to provide clear video footage in low-light or night-time conditions.	COMPLY or DO NOT COMPLY

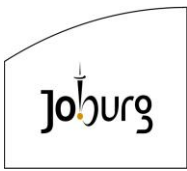
Part 3: Scope of Work

Minimum Illumination: The camera should have low-light capabilities with a minimum required illumination level.	COMPLY or DO NOT COMPLY
ONVIF Profile S	COMPLY or DO NOT COMPLY
Ethernet Port: The camera should have an Ethernet port for stable network connectivity.	COMPLY or DO NOT COMPLY
PoE Support: Preferably, support for Power over Ethernet (PoE) to simplify installation and reduce cabling requirements.	COMPLY or DO NOT COMPLY
Ceiling or Wall Mount: The camera should be mountable on both ceilings and walls for flexible installation.	COMPLY or DO NOT COMPLY
Camera Management: Intuitive software for camera configuration, settings adjustments, and firmware updates.	COMPLY or DO NOT COMPLY
Video Analytics: Support for video analytics features, such as motion detection, tampering detection, and object tracking, facial recognition.	COMPLY or DO NOT COMPLY
Compatibility with various video management systems and network video recorders.	COMPLY or DO NOT COMPLY

Camera Analytics (AI)	
Motion Detection: Detects movement within the camera's field of view and triggers events or alerts.	COMPLY or DO NOT COMPLY
Tampering Detection: Detects any tampering with the camera, such as blocking or defocusing, and sends alerts.	COMPLY or DO NOT COMPLY
Line Crossing Detection: Triggers events when an object crosses a virtual boundary or line.	COMPLY or DO NOT COMPLY
Intrusion Detection: Detects unauthorized entry into a specific area or zone and raises alerts.	COMPLY or DO NOT COMPLY
People Counting: Counts the number of people passing through a specific area or entrance.	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

Object Detection: Identifies and tracks specific objects, such as vehicles, bags, or other items of interest.	COMPLY or DO NOT COMPLY
Facial Recognition: Recognizes and identifies faces in the camera's field of view, comparing them against a predefined database.	COMPLY or DO NOT COMPLY
License Plate Recognition (LPR): Reads and recognizes license plates from vehicles passing through the camera's coverage area.	COMPLY or DO NOT COMPLY
Audio Analytics: Analyses audio data to detect specific sounds or abnormal noise patterns, such as gunshots or breaking glass.	COMPLY or DO NOT COMPLY
Heat map Analysis: Generates heat map to show the areas with the highest activity or foot traffic.	COMPLY or DO NOT COMPLY
Queue Management: Monitors and analyses queues or lines, providing real-time alerts when queues exceed defined thresholds.	COMPLY or DO NOT COMPLY
Loitering Detection: Identifies individuals or objects that remain stationary for an extended period in a designated area.	COMPLY or DO NOT COMPLY
Fall Detection: Detects falls or sudden movements indicative of accidents or incidents.	COMPLY or DO NOT COMPLY
Left/Removed Object Detection: Detects when an object is left behind or removed from a designated area.	COMPLY or DO NOT COMPLY
Back-Up Power	
Wall-mount / Rackmount 5KV Inverter with MPPT solar input	
Zero (0ms) transfer time to protect mission-critical loads such as servers and ATMs	COMPLY or DO NOT COMPLY
Touchable button with large 5" coloured LCD	COMPLY or DO NOT COMPLY
Built-in Wi-Fi for mobile monitoring (Android/iOS App is available)	COMPLY or DO NOT COMPLY
Supports USB On-the-Go function	COMPLY or DO NOT COMPLY



Part 3: Scope of Work

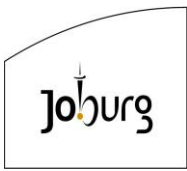
Reserved communication port for BMS (RS485, CAN-BUS, RJ45, RS232)	COMPLY or DO NOT COMPLY
Configurable AC/PV output usage timer and prioritization	COMPLY or DO NOT COMPLY
Pure sine wave solar inverter	COMPLY or DO NOT COMPLY
Selectable high-power charging current	COMPLY or DO NOT COMPLY
Wide DC input range	COMPLY or DO NOT COMPLY
Compatible to mains voltage or generator power	COMPLY or DO NOT COMPLY
Auto restart while AC is recovering	COMPLY or DO NOT COMPLY
Overload and short circuit protection	COMPLY or DO NOT COMPLY
Smart battery charger design for optimized battery performance	COMPLY or DO NOT COMPLY
Cold start function	COMPLY or DO NOT COMPLY
Rated Power - 5000VA/5000W	COMPLY or DO NOT COMPLY
Parallel Capability - Up to at least 5 units	COMPLY or DO NOT COMPLY
INPUT Voltage - 230 VAC	COMPLY or DO NOT COMPLY
Voltage Range - 110-280 VAC	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

Frequency Range - 50 Hz/60 Hz (Auto sensing)	COMPLY or DO NOT COMPLY
OUTPUT AC Voltage Regulation - 230 VAC $\pm$ 5%	COMPLY or DO NOT COMPLY
Output Total Harmonic Distortion (THDv) $\leq$ 3% for Linear load, $\leq$ 8 % for nonlinear load	COMPLY or DO NOT COMPLY
Surge Power 6000VA for 5 sec 10000VA for 5 sec	COMPLY or DO NOT COMPLY
Efficiency (Peak) - 93 % at Line Mode, 90% at Battery Mode	COMPLY or DO NOT COMPLY
Transfer Time 0 ms	COMPLY or DO NOT COMPLY
The system shall have remote Management connection capabilities not limited to the following interfaces: RJ 45, RS 232, Wi-Fi etc.	COMPLY or DO NOT COMPLY
Wall-mount / Rackmount 8KV Inverter	
Customizable status LED bar with RGB lights	COMPLY or DO NOT COMPLY
Touchable button with large 5" coloured LCD	COMPLY or DO NOT COMPLY
Built-in Wi-Fi for mobile monitoring (Android/iOS App is available)	COMPLY or DO NOT COMPLY
Supports USB On-the-Go function	COMPLY or DO NOT COMPLY
Data log events stored in the inverter	COMPLY or DO NOT COMPLY
Reserved communication port for BMS (RS485, CAN-BUS or RS232)	COMPLY or DO NOT COMPLY
Replaceable fan design for ease of maintenance	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

Configurable AC/PV output usage timer and prioritization	COMPLY or DO NOT COMPLY
Selectable high-power charging current	COMPLY or DO NOT COMPLY
Compatible to Utility Mains or generator input	COMPLY or DO NOT COMPLY
Built-in anti-dust kit	COMPLY or DO NOT COMPLY
Built-in DC output for DC fan, LED bulb, router and so on	COMPLY or DO NOT COMPLY
Parallel operation with 6 units	COMPLY or DO NOT COMPLY
Rated Power - 8000VA/8000W	COMPLY or DO NOT COMPLY
Parallel Capability - Up to at least 5 units	COMPLY or DO NOT COMPLY
INPUT Voltage - 230 VAC	COMPLY or DO NOT COMPLY
Selectable Voltage Range - 170-280 VAC (For Personal Computers) ; 90-280 VAC (For Home Appliances)	COMPLY or DO NOT COMPLY
Frequency Range - 50 Hz/60 Hz (Auto sensing)	COMPLY or DO NOT COMPLY
OUTPUT AC Voltage Regulation (Batt. Mode) 230VAC $\pm$ 5% 6.4.8.2.20 Surge Power - 16000VA 93%	COMPLY or DO NOT COMPLY
Surge Power - 16000VA 93%	COMPLY or DO NOT COMPLY
Transfer Time 15 ms (For Personal Computers); 20 ms (For Home Appliances)	COMPLY or DO NOT COMPLY



Part 3: Scope of Work

Waveform - Pure sine wave	COMPLY or DO NOT COMPLY
No Load Power Consumption - < 70W	COMPLY or DO NOT COMPLY
DC Voltage - 12 VDC $\pm$ 5%, 100W	COMPLY or DO NOT COMPLY
The system shall have remote Management connection capabilities not limited to the following interfaces: RJ 45, RS 232, Wi-Fi etc.	COMPLY or DO NOT COMPLY
48VDC 5.12kWh LITHIUM IRON PHOSPHATE BATTERIES	
Battery Voltage - 48 VDC	COMPLY or DO NOT COMPLY
Floating Charge Voltage - 54 VDC	COMPLY or DO NOT COMPLY
Overcharge Protection - 66 VDC	COMPLY or DO NOT COMPLY
Solar Charger & AC Charger	COMPLY or DO NOT COMPLY
Solar Charger Type – MPPT	COMPLY or DO NOT COMPLY
Maximum PV Array Power - 8000W (4000W x 2)	COMPLY or DO NOT COMPLY
MPPT Range @ Operating Voltage 90 ~ 450 VDC	COMPLY or DO NOT COMPLY
Maximum PV Array Open Circuit Voltage - 500 VDC	COMPLY or DO NOT COMPLY
Maximum Solar Charge Current - 150A	COMPLY or DO NOT COMPLY
Maximum AC Charge Current - 120A	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

Maximum Charge Current - 150A	COMPLY or DO NOT COMPLY
Communication Interface - USB/RS 232/RS 485/Wi-Fi/Dry-contact	COMPLY or DO NOT COMPLY
Humidity - 5% to 95% Relative Humidity(Non-condensing)	COMPLY or DO NOT COMPLY
Operating Temperature -10°C to 50°C	COMPLY or DO NOT COMPLY
Storage Temperature -15°C to 60°C	COMPLY or DO NOT COMPLY
Compliance Safety - CE	COMPLY or DO NOT COMPLY
Must have a life span of at least 10 years	COMPLY or DO NOT COMPLY

Supplier Compliance and Legal Requirements	
Proposed Health and Safety Plan in compliance with OHS (Occupational Health and Safety) standards and regulations.	COMPLY or DO NOT COMPLY
Suppliers shall have a permanent South African office (physical address) with a minimum 3-year track record for supply and support of CCTV Systems	COMPLY or DO NOT COMPLY
Advanced-level support shall be available from the South African office on all supplied products	COMPLY or DO NOT COMPLY
Project Management methodology and roll-out plan with high-level Gantt-chart	COMPLY or DO NOT COMPLY
An overall system diagram showing the interconnections between equipment, cable routes, camera and access control points.	COMPLY or DO NOT COMPLY
Provide a detailed as-built documents at the end of the project inclusive of drawings (Visio), indicating cable routes, placement of cameras and access control points, all usernames and	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

passwords of the system. Including all make, model and serial numbers of all equipment installed.	
Quality plan based on ISO9001 Quality Management System	COMPLY or DO NOT COMPLY
Provide Site Acceptance Test (SAT) procedures	COMPLY or DO NOT COMPLY
Environmental plan, based on ISO14001 Environmental System	COMPLY or DO NOT COMPLY
Compliance with privacy laws and regulations including Data protection and retention policies such as required by POPI (Protection of Personal Information)	COMPLY or DO NOT COMPLY
Compliance with industry standards (e.g., GDPR, PCI-DSS)	COMPLY or DO NOT COMPLY
As and when required camera installations will be subject to the ROTAKIN standard testing evaluation process.	COMPLY or DO NOT COMPLY
Company must be CIDB registered, certificate must be handed in with the quotation.	COMPLY or DO NOT COMPLY
All designs must be confirmed by an Electronics Engineer and signed-off in his professional capacity	COMPLY or DO NOT COMPLY
The supplier must be IRA registered. The certificate must be in the name of the supplier and must be handed in with the quotation.	COMPLY or DO NOT COMPLY

Standards Applicable	
SANS Series of specifications for general CCTV installation practice: (SANS 10222-5-1-1, SANS 10222-5-1-3, SANS 10222-5-1-4 and SANS 10222-5-1-5 and SANS 10222-5-1-2, SANS 10142)	COMPLY or DO NOT COMPLY
All cameras shall be ONVIF API compliant with version 1.02, 2.00 and Profile S	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

ROTAKIN Standard in accordance with BS EN 50132-7	COMPLY or DO NOT COMPLY
SANS 10222-5-1-1 Electrical security installations Part 5-1-1: CCTV installations - CCTV surveillance systems for use in security applications - Operational requirements	COMPLY or DO NOT COMPLY
SANS 10222-5-1-2 Electrical security installations Part 5-1-2: CCTV installations - CCTV surveillance systems for use in security applications - System design requirements	COMPLY or DO NOT COMPLY
SANS 10222-5-1-3 Electrical security installations Part 5-1-3: CCTV installations - CCTV surveillance systems for use in security applications - Installation, planning and implementation requirements	COMPLY or DO NOT COMPLY
SANS 10222-5-1-4 Electrical security installations Part 5-1-4: CCTV installations - CCTV surveillance systems for use in security applications - Testing, commissioning and hand-over requirements	COMPLY or DO NOT COMPLY
SANS 10222-5-1-5 Electrical security installations Part 5-1-5: CCTV installations - CCTV surveillance systems for use in security applications - Maintenance requirements	COMPLY or DO NOT COMPLY
BS EN 62676 series Video surveillance systems for use in security applications	COMPLY or DO NOT COMPLY
BS EN 62676-1-1 Video System Requirements	COMPLY or DO NOT COMPLY
BS EN 62676-1-2 Video Transmission – General Video Transmission - Requirements	COMPLY or DO NOT COMPLY
BS EN 62676-2-1 Video Transmission Protocols – General Requirements	COMPLY or DO NOT COMPLY
BS EN 62676-2-2 Video Transmission Protocols – IP Interoperability implementation based on HTTP and REST services	COMPLY or DO NOT COMPLY
BS EN 62676-2-3 Video Transmission Protocols – IP Interoperability implementation based on web services	COMPLY or DO NOT COMPLY
BS EN 62676-3 Analog and Digital Video Interfaces	COMPLY or DO NOT COMPLY
Suppliers must be IRA registered. The IRA certificate must be in the name of the supplier.	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

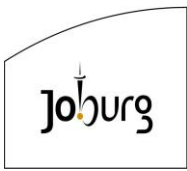
BS EN 62676-4 Application guidelines	COMPLY or DO NOT COMPLY
BS EN 60529 Degrees of Protection provided by Enclosures (IP Code)	COMPLY or DO NOT COMPLY
BS EN 62305 series Protection against Lightning	COMPLY or DO NOT COMPLY
BS EN 50132-7 CCTV surveillance systems for use in security applications: Application guidelines	COMPLY or DO NOT COMPLY
BS EN ISO 11064-1 Ergonomic design of control centres - Principles for the design of control centres	COMPLY or DO NOT COMPLY
BS EN ISO 11064-2 Ergonomic design of control centres - Principles for the arrangement of control suites	COMPLY or DO NOT COMPLY
BS EN ISO 11064-3 Ergonomic design of control centres - Control room layout	COMPLY or DO NOT COMPLY
BS 7958 CCTV Management and Operation – Code of Practice	COMPLY or DO NOT COMPLY
BS 8418 Installation and remote monitoring of detector activated CCTV systems – Code of practice	COMPLY or DO NOT COMPLY
BS 8495 Code of Practice for digital CCTV recording systems for image export to be used as evidence	COMPLY or DO NOT COMPLY

SYSTEM OVERVIEW	
Local Security Control Room	
The Local Security Control Room shall be responsible for responding to alarms from sites and managing incidents on site using the CCTV data.	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

The connection between the Local Security Server and the Local Security Control Room shall be a dedicated link (e.g., a Diginet line, fibre / microwave link). There may also be a backup links directly between the Local Security Control Room and sites if this is deemed necessary.	COMPLY or DO NOT COMPLY

Installation	
To ensure quality workmanship and sound engineering installation practice, it is imperative that the Supplier adheres to these specifications and standard.	Requirement
The Johannesburg Water shall accept only experienced certified CCTV and access control installers.	COMPLY or DO NOT COMPLY
All installers shall adhere to the Occupational Health and Safety Act of 1970 when installing the system.	COMPLY or DO NOT COMPLY
All equipment shall have a mechanical earth connected to the site earth according to SANS.	COMPLY or DO NOT COMPLY
All equipment shall be designed and specified for a minimum operational life of at least 5-years under the prevailing environmental conditions.	COMPLY or DO NOT COMPLY
All equipment shall be labelled in accordance with the design diagrams, with durable, weather resistant labels.	COMPLY or DO NOT COMPLY
Cable and wiring marking shall be in accordance with the Standard for Wiring and Cable Marking.	COMPLY or DO NOT COMPLY
All cables and wires shall be marked with a unique identification, at all terminations, in accordance with the cabling and wiring diagrams supplied.	COMPLY or DO NOT COMPLY
All of the splices and connections shall be mechanically secure and shall provide electrical contact without stress on connections and terminals.	COMPLY or DO NOT COMPLY
Any hole that insulated conductors pass through shall be provided with a smooth, rounded bushing, or shall have smooth, rounded surfaces upon which the insulated conductors may bear.	Requirement
Wire-ways shall be smooth and free from sharp edges or moving parts that may damage wiring.	Requirement



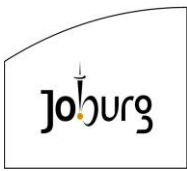
Part 3: Scope of Work

The CCTV installation shall be signed off by the Johannesburg Water's appointed Project manager for each project implemented.	COMPLY or DO NOT COMPLY

ADDITIONAL REQUIREMENTS	
Installation signoff of the System	
The CCTV design shall be signed off as accepted by Johannesburg Water appointed Project Engineer before installation of the system can begin. No work may begin on site without design approval from Johannesburg Water and a site kick off meeting	COMPLY or DO NOT COMPLY
Any changes to the design made during the course of installation shall be approved by the Project Engineer via a project change request (PCR) or a formal site instruction and reflected in the as-built design documents.	COMPLY or DO NOT COMPLY

Commissioning of the system	
Commissioning of the System includes adjusting all necessary settings to ensure that the installation meets the CCTV functional requirements. This requires explicit testing of the system including the simulation of incidents in all lighting conditions (sunrise, full sun, sunset, night). Commissioning tests include testing the interface between the CCTV system and the security control room (off site and on site).	COMPLY or DO NOT COMPLY
The site will not be accepted until Site Acceptance Tests prove that the installation meets all requirements as set out in the site-specific functional requirements.	Requirement
If the Site Acceptance Tests are not met after corrections have been made, the relevant contract defects process shall be followed.	COMPLY or DO NOT COMPLY

Documentation
On completion of the installation the Supplier shall provide Johannesburg Water with the following documentation:
Detailed as-built drawings of the installation including the following:



Part 3: Scope of Work

A site layout diagram indicating the position of all equipment and devices installed including all usernames and passwords for the entire system.	COMPLY or DO NOT COMPLY
A complete cable block and wiring diagram with cable & wire numbers	COMPLY or DO NOT COMPLY
Coverage plots of the areas covered by intruder detectors and a list and description of each zone.	COMPLY or DO NOT COMPLY
Coverage plots of the areas covered by cameras' fields of view	COMPLY or DO NOT COMPLY
Alarm system zones	COMPLY or DO NOT COMPLY

Training Manuals for the CCTV surveillance system must include the following:	
An overview of the CCTV and intruder detection system, including the equipment block schematic.	COMPLY or DO NOT COMPLY
The functions and features of each item of equipment.	COMPLY or DO NOT COMPLY
Individual operating instructions for each item of equipment.	COMPLY or DO NOT COMPLY
Detailed operating instructions for all modes of operation of the CCTV system.	COMPLY or DO NOT COMPLY
Manufacturer's technical and maintenance specifications for each item of equipment installed.	COMPLY or DO NOT COMPLY

All documents shall be provided in soft and hard copy. Drawings softcopies shall be provided in CAD files in .dwg format. Other soft copy documents shall be provided in a pdf format during the submission of the bid document.	COMPLY or DO NOT COMPLY
All system and camera settings shall be recorded, so that they can be confirmed and reproduced as required.	COMPLY or DO NOT COMPLY

Part 3: Scope of Work

Where possible these settings and configurations shall consist of backup files which can be loaded onto the relevant equipment in the case of malfunction or replacement.	COMPLY or DO NOT COMPLY
Where the equipment does not allow for softcopy backup, an electronic document listing the settings may be provided.	COMPLY or DO NOT COMPLY
Warranty and Certification	
All equipment installed shall be subject to the OEM (Original Equipment Manufacturer) warranty	COMPLY or DO NOT COMPLY
Contractor shall provide proof that technicians have been trained and certified to install and configure the CCTV equipment specified.	COMPLY or DO NOT COMPLY
There shall be an agreement from the OEM that the OEM supports the offering and will continue to support the product if the supplier defaults.	COMPLY or DO NOT COMPLY
Engineering and Operational Access	
Johannesburg Water security personnel shall be able to connect to the Local Security Server remotely from the LAN to perform maintenance and administrative tasks on the system.	COMPLY or DO NOT COMPLY
Members of Johannesburg Water personnel shall be able to connect to the security server remotely from the Johannesburg Water corporate network in order to perform operational tasks (check-up time of systems, confirm sites are being armed etc.) and investigations (view footage and alarm logs etc.).	COMPLY or DO NOT COMPLY
This remote access shall be restricted to those who have explicitly been granted access rights.	COMPLY or DO NOT COMPLY

9.25 ACCESS CONTROL SYSTEM

SCOPE: This requirement is based on the current needs of the prioritised buildings, dedicated solutions and systems as specified in this document.
GENERAL SYSTEM CONCEPT
Access Control:

Part 3: Scope of Work

The Access Control system is required to grant access to persons authorised to access the facilities for purposes of their daily duties, as well as for visitors who need to access the facilities for legitimate reasons.	COMPLY or DO NOT COMPLY
The Access Control system is required to effectively control access without obstructing service delivery.	COMPLY or DO NOT COMPLY
The Access Control system must keep an accurate record of all access, including date, time and identity of all persons accessing the facility or departing from such a facility.	COMPLY or DO NOT COMPLY
The Access Control system must identify all persons entering the facility by means of biometric fingerprint scanning as default, access cards and or identification.	COMPLY or DO NOT COMPLY
The Access control system must be integrated with the CCTV surveillance system and must share a database in such a manner that cross-referencing between Access Control System data and CCTV data must be available as a standard system feature including Automatic Number Plate Recognition (ANPR) analytics.	COMPLY or DO NOT COMPLY
The Access Control System database must be developed to interface to the Johannesburg Water PERSAL system such that access to facilities can be withdrawn from the system when employment of persons is terminated or such that access to various facilities can be granted via a central database to a collection of facilities that may be under a single command.	COMPLY or DO NOT COMPLY
The Access Control System must be supplied as a complete system with all hardware and software supplied, delivered, installed, commissioned and tested. Full user training must be provided.	COMPLY or DO NOT COMPLY

9.26 INTRUDER ALARM SYSTEM

The contractor will supply, install, and commission an intruder alarm system in the two blocks, the mega warehouse and the overflow block.

Internal passive detectors for the security alarm system will be installed to fully cover the two buildings.

An alarm keypad with multiple programmable functions must be installed (next to and at the same height as the light switch) in the two buildings.

There will be LED lights outside on each block, above the main exit doors of the warehouse and the overflow building. The LED lights will indicate the state of the localized alarm, e.g. a red LED means the alarm is armed and a green LED means the alarm is not armed. The LED lights must also indicate if the alarm has been triggered.

Part 3: Scope of Work

Each localized alarm system will have a siren installed in the ceiling of the building that is audible across the full extent of the mega warehouse and overflow building terrain and the surrounding area.

The intruder alarm system will also have a centralized main control panel that cater for the various operational scenarios, such as when the respective responsible person who arm the intruder alarm system is coming late, leaving early, not at work, etc. Below is a list of requirements for the main control panel of the mega warehouse security system:

The main control panel of the mega warehouse security system will be installed in the security control room.

The keypad that interfaces to the main control panel will be next to the front door on the inside of the mega warehouse building. An officer must be able to arm and disarm each localized alarm from this keypad.

A display/mimic panel with an LED for each localized alarm system will be installed near the mega warehouse building keypad. The display panel must mimic the mega warehouse and the overflow building layout, and it will be engraved names for each building. A red LED in a building means the alarm of the block is armed and a green LED means the alarm is not armed. The display/mimic panel will also indicate which localized alarm systems have been triggered.

It must not be possible to view the display panel from the outside of the building.

The mega warehouse display/mimic panel will be powered from the main control panel.

The mega warehouse and the overflow building will have a siren that is audible across the full extent of the premises terrain and the surrounding area to the whole Joburg Water facility.

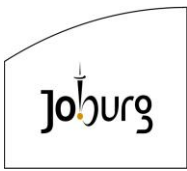
The main control panel will have the means or provision for remote/external communication via a network cable (control via network/internet) or radio transmitter. It must be possible to easily configure the system in future so that it can signal an emergency response service provider when any of the localized alarm systems is activated.

A display/mimic panel similar to the one in the mega warehouse will be installed in the overflow building.

All the expander and control panels must have battery backup for up to 72 hours.

The system components shall be of a type that enjoys excellent product support in South Africa by more than one firm that has been in operation supporting the product for more than 5 years.

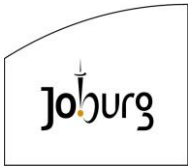
The security system must be comprehensively protected against electrical surges.



Part 3: Scope of Work

The security system must function independently of other electronic systems and the ICT network (but it must also be possible to set the alarm system up in such a manner that it can be controlled via the ICT network).

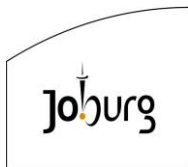
The Intruder Alarm System must comply with SANS 60839-2-6:2010 or latest.



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Part 3: Scope of Work



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Volume 2
Part 4: Site Information



Johannesburg Water (SOC) Ltd



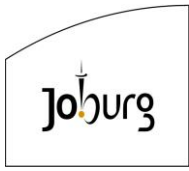
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**BUILDING UPGRADE FOR THE MEGA WAREHOUSE
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PART 4: SITE INFORMATION

Employer:		Contractor	
Witness:		Witness:	

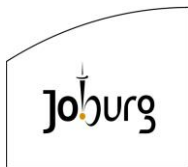
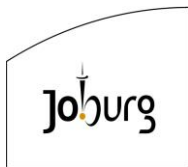


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C4 SITE INFORMATION

C4.1 GENERAL

This section describes the site at the time of tender to enable the tenderer to price his tender and to decide upon his method of working and programming and risks.

C4.2 SITE LOCATION

The site is situated in Johannesburg Water Operations' Langlaagte Depot, 2 Link Road, Langlaagte

C4.3 ACCESS TO SITE AND RESTRICTIONS

Any permission as may become necessary shall be the responsibility of the Contractor to obtain.

Having been granted access to works areas by the Employer, other service authorities and private owners, the Contractor shall adhere to any agreed conditions of access and ensure the works area is left in a condition similar to when it was first accessed. It must be kept in mind that part of the site is located within a private business development and care must be taken not to compromise the safety/ security of the workers or property of the development or those of adjacent developments / properties.

C4.4 EXISTING SERVICES, SERVITUDES AND WAYLEAVES

For detailed specification the Contractor shall refer to clauses PS1.5 (Temporary Works), PS4.5 (Existing services), and PS4.8 (Permits and wayleaves). Wayleaves obtained to date are attached at the end of Section C4 : Annexure To Specifications

C4.5 SECURITY

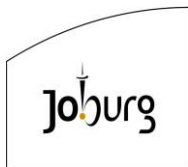
The Contractor shall be responsible for the security of his personnel, materials, equipment and construction plant on and around the site of the Works and for the security of his camp (if applicable). The Employer in this regard will consider no claims.

Refer to clause PS6.1 (Security)

C4.6 NATURE OF GROUND AND SUBSOIL CONDITIONS

It shall be the Contractor's responsibility to acquaint himself with the conditions of the site. A geotechnical study has been done and is available upon request.

Employer:		Contractor	
Witness:		Witness:	



C4.7 GEOTECHNICAL REPORT AND BOREHOLE CORES

A geotechnical report is available on request. It shall be the Contractor's responsibility to acquaint himself with the conditions of the site when submitting his or her rates.

C4.8 HYDROLOGICAL REPORT AND FLOODLINES

There are no supporting documents available with regard hydrological and floodline aspects.

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Johannesburg Water SOC Ltd



CONTRACT JW14452

BUILDING UPGRADE FOR THE MEGA WAREHOUSE IN LANGLAAGTE DEPOT

VOLUME 2A

PART 3:

SCOPE OF WORK

C3.2 PARTICULAR SPECIFICATIONS

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PREAMBLE TO SCOPE OF WORK

General

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

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

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

Scope

This Project Specification is set out in three portions:

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

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

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

Status

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

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C3 SCOPE OF WORKS

C3.3 PARTICULAR SPECIFICATIONS

C3.3.1 CIVIL

PA FENCING

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

PD 01	SCOPE
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PD 03	DOORS AND WINDOWS
PD 04	GLAZING
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PD 06	ROOF SHEETING AND ACCESSORIES
PD 07	ELECTRICAL WORK
PD 08	PLUMBING
PD 09	PAINTING
PD 10	MEASUREMENT AND PAYMENT

ELECTRICAL

E100 STANDARD ELECTRICAL LOW VOLTAGE SPECIFICATION

E100.1	GENERAL DESIGN
E100.2	TESTING AND COMMISSIONING
E100.3	LOW VOLTAGE CABLES
E100.4	LOW VOLTAGE SWITCHGEAR AND CONTROL GEAR ASSEMBLIES
E100.5	CABLE SUPPORT SYSTEMS
E100.6	WIRING AND OUTLETS
E100.7	LIGHTNING
E100.8	STREET AND AREA LIGHTNING

Employer:		Contractor:	
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C3.3.1.1 PA FENCING

C3.3.1.1.1 PA 01 SCOPE

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

C3.3.1.1.2 PA 02 TYPE OF FENCE

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

C3.3.1.1.3 PA 03 MATERIALS

C3.3.1.1.3.1 PA 03.1 POSTS, STAYS AND STANDARDS

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

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

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

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

C3.3.1.1.3.2 PA 03.2 BOLTS FOR STAYS

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

C3.3.1.1.3.3 PA 03.3 WIRE

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

(a) Barbed wire

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

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

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

(b) Smooth wire

Smooth wire shall be of the types specified below:

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

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
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(c) Barbed-tape concertinas

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

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

C3.3.1.1.3.4 PA 03.4 DIAMOND MESH

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

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

C3.3.1.1.3.5 PA 03.5 GATES

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

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

C3.3.1.1.3.6 PA 03.6 CONCRETE

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

C3.3.1.1.4 PA 04 CLEARING FENCE LINE

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

C3.3.1.1.5 PA 05 INSTALLING POSTS AND STANDARDS

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

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

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

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

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

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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

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

C3.3.1.1.6 PA 06 INSTALLING WIRE

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

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

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

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

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

C3.3.1.1.7 PA 07 INSTALLING DIAMOND MESH

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

C3.3.1.1.8 PA 08 INSTALLING BARBED-TAPE CONCERTINAS

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

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

C3.3.1.1.9 PA 09 CLOSING OPENINGS UNDER FENCES

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

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Witness:		Witness:	

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

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

C3.3.1.1.10 PA 10 INSTALLING GATES

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

C3.3.1.1.11 PA 11 GENERAL REQUIREMENTS AND TOLERANCES

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

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

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

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

C3.3.1.1.12 PA 12 MEASUREMENT AND PAYMENT

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

(a) Barbed wire (grade, size and type of wire indicated).....Unit: m

(b) Smooth wire (grade and size indicated).....Unit: m

(c) Barbed tape concertinas (coil diameter indicated).....Unit: m

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

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

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

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

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

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

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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

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

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

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

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

C3.3.1.1.12.2 PA 12.2 New gates

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

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

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

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

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

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

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

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
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C3.3.1.3 PD BUILDING WORK

C3.3.1.3.1 PD 01 SCOPE

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

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

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

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

C3.3.1.3.2.1 PD 02.1 MATERIALS

(a) Bricks

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

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

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

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

(b) Cement

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

(c) Aggregate

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

(d) Water

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

(e) Wall ties

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

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
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(f) Damp-proof sheeting

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

C3.3.1.3.2.2 PD 02.2 CONSTRUCTION OF BRICKWORK

(a) Cement mortar

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

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

(b) Brickwork

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

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

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

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

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

(c) Reinforced brickwork

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

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

(d) Key for plaster

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
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Joints of all brickwork receiving plaster shall be raked out, or the brick surfaces shall otherwise be prepared with an acrylic slurry or any other approved bonding agent.

(e) Damp-proofing

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

(f) General

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

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

C3.3.1.3.2.3 PD 02.3 PLASTER WORK

(a) Plaster coats

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

(b) Thickness

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

(c) Workmanship

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

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

C3.3.1.3.2.4 PD 02.4 FLOOR SCREEDS

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

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

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

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

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

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



C3.3.1.3.3 PD 03 DOORS AND WINDOWS

C3.3.1.3.3.1 PD 03.1 MATERIALS

(a) General

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

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

(b) Pressed-steel door frames

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

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

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

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

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

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

(c) Pressed-steel doors

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

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

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

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

(d) Steel window frames

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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

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

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

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

Frames shall be fitted with standard fixing lugs.

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

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

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

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

(e) Door-locks and handles

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

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

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

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

(f) Miscellaneous fittings

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

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

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

(g) Aluminium windows and doors

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

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

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



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

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

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

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

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

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

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

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

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

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

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

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

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



C3.3.1.3.3.2 PD 03.2 INSTALLATION OF DOORS AND WINDOWS

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

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

C3.3.1.3.4 PD 04 GLAZING

C3.3.1.3.4.1 PD 04.1 MATERIALS

(a) Glass

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

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

Unless otherwise specified, sheet glass for glazing shall be flat-drawn clear glass of ordinary glazing quality and of the thicknesses indicated below:

For panes not exceeding 0,75 m² in area 3 mm

For panes exceeding 0,75 m² but not exceeding 1,5 m² in area 4 mm

(b) Putty

All putty shall comply with the requirements of SANS 680.

Putty shall not be too hard or soft or caked when used and shall dry evenly without crazing or cracking.

Defective putty shall be cut out and replaced by the Contractor at his own expense, and any broken glass shall also be so replaced and putty so repainted.

C3.3.1.3.4.2 PD 04.2 GLAZING

Glass shall be cut in panes to suit all glazed openings with sufficient clearance all round to prevent cracking by expansion, contraction, or vibration.

In all cases the glass shall be well bedded and back-puttied and installed as specified in SANS Code of Practice 10137.

All putty shall be carefully trimmed, cleaned off and neatly finished off straight with smooth surfaces and sharp mitres. A paint primer shall be applied as soon as the putty has dried out sufficiently to prevent shrinkage cracks from forming.

The entire glazing operation shall be cleaned before the premises are handed over for occupation.

C3.3.1.3.5 PD 05 CARPENTRY AND JOINERY

C3.3.1.3.5.1 PD 05.1 GENERAL

(a) Materials

All timber used for structural purposes shall be of merchantable grade and shall comply with the requirements of SANS 1783-1 and SANS 1783-2. Structural timber shall be carefully selected and

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



of the best quality, free from large or dead knots, shakes, waney edges or other defects. Purlins and brandering shall comply with the requirements of SABS 1783-4. Finger-jointed structural timber shall comply with the requirements of SANS 10096 and laminated timber with the requirements of SABS 1460.

Hardwoods and softwoods for joinery shall comply with SANS 1099 and SANS 1783-3 respectively and suitable species shall be used for the various purposes.

Unless otherwise specified, all materials shall conform to the appropriate SANS or BS Specification where such standards exist for nails, screws, bolts, adhesives, etc.

(b) Preservative treatment

All structural timber shall be given a preservative treatment suitable for the duty for which the timber is intended in accordance with SANS 10005, and no untreated timber shall be used. The preservative treatment shall not impair the final finish. The timber shall be impregnated throughout. When surface coating is specified, the compounds applied on the surfaces of the timber shall form an unbroken film.

(c) Priming

The jointing surfaces of all joints exposed to the weather and built-in portions of frames shall be thickly primed except where adhesives are specified.

Carpentry and joinery items which are prepared for painting by the manufacturer, shall be knotted and primed before being dispatched to the Site.

Primed surfaces shall be touched up where necessary during the progress of the work or where site adjustments have been made.

C3.3.1.3.5.2 PD 05.2 CARPENTRY WORK

(a) Scope of work

Carpentry work shall be carried out in a manner consistent with good workmanship and in compliance with the drawings.

The carpenter shall perform all cutting away and making good in attendance upon all other trades and he shall provide and maintain temporary coverings required for the protection of any finished work that might be damaged if left unprotected during the progress of the work.

(b) Dimensions

Unwrought timber shall be as sawn and shall be to the dimensions and within the tolerances specified in the relevant SANS Standard Specifications mentioned in subclause PD 05.1(a).

(c) Jointing

Unless otherwise specified, all joints shall be secured by means of a suitable type and a sufficient number of approved connectors. All joints shall be carefully made in such a way that they will not impair the strength and stiffness of the beams or members.

(d) Timber roof construction

The plates, joists, rafters, purlins, brandering and other pieces used for the construction of the roof and trusses shall be of the dimensions, spacing and construction as shown on the drawings.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



All the joints in the framework shall be of the most appropriate type, accurately formed and adequately secured with fasteners as specified.

C3.3.1.3.5.3 PD 05.3 JOINERY WORK

(a) Scope of work

Joinery work shall consist of the manufacture, delivery to the site, and fixing in the buildings, of all joinery shown on the drawings.

Except where a special finish is specified, the Contractor shall have all stairs, landings, doors, shelves, and other joinery work cleaned and scrubbed down and shall leave all his work in a good order to the satisfaction of the Engineer.

(b) Dimensions

All wrought timber shall be sawn, planed, drilled, or otherwise machined or worked to the correct sizes and shapes shown on the drawings.

Reasonable tolerances shall be provided at all connections between joinery works and the building structure to compensate adequately for any irregularities, settlements, or any other movements.

(c) Manufacture

The joiner shall perform all the necessary mortising, tenoning, grooving, matching, tonguing, housing, rebating and all the other works necessary for correct jointing. He shall also provide all metal plates, screws, nails, and other fixings that may be necessary for doing the specified joinery work properly.

(d) Joints

Where joints are not specifically indicated, they shall be the recognised forms of joints for each position. The joints shall be so made as to comply with Part 2 of BS 1186.

(e) Doors and frames

Door frames, linings, panel doors, framed, ledged and braced doors, flush doors, sliding doors, etc. shall be supplied or made by the joiner and shall be installed, fitted, or hung as detailed on the drawings.

All timber shall be wrought and prepared for oiling, staining, varnishing, or painting.

(f) Skirtings, cornices, etc.

Skirtings, cornices, etc. shall not be installed until after the wall coverings have been applied, the flooring laid and ceilings installed, unless otherwise specified.

(g) In-situ joinery

In-situ joinery work shall not be executed until after all floor, wall and ceiling surfaces have been formed or constructed, unless otherwise instructed.

(h) Ceilings

Ceilings shall consist of plaster board or fibre-cement panels as shown on the drawings and shall be nailed to the bracing or suspended from the roof structure. The panels shall be separated by exposed tees and insulated with a 50 mm thick fibreglass wool blanket where shown on the drawings.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



C3.3.1.3.6 PD 06 ROOF SHEETING AND ACCESSORIES

Roof sheeting and accessories shall comply with and will be measured and paid for under SANS 1200 HC.

C3.3.1.3.7 PD 07 ELECTRICAL WORK

The electrical wiring of buildings shall be carried out by registered and licensed electricians in accordance with the requirements of SANS 10142-1 and the regulations of the Employer.

The electrician shall work in close co-operation with the Contractor to ensure that all conduits, switchboards, plug boxes and switch boxes are installed in their correct position.

The work shall be carried out in accordance with the drawings and to the satisfaction of the Engineer and the local authority.

C3.3.1.3.8 PD 08 PLUMBING

C3.3.1.3.8.1 PD 08.1 MATERIALS

(a) General

All materials shall be of the best quality and shall be approved by the Engineer before installation. Cracked, chipped, dented, or faulty items or materials shall be replaced at the Contractor's expense. Glazed ceramic sanitary ware shall comply with the requirements of SANS 497 and all other materials shall comply with the standards as specified, scheduled, or shown on the Drawings.

(b) Water closet (WC) suites

WC suites shall consist of a white glazed vitreous china closet with an S or P trap and seat lugs, a 14 litre low-level matching flat-bottomed flushing cistern placed and fixed on the closet, or a suspended enameled cast-iron cistern with the flush pipe connected to the flushing rim of the closet with rubber cone joints, and a solid heavy-duty plastic seat with cover, hinges and buffers.

(c) Urinals

Urinals shall be of the type detailed or scheduled, of white glazed vitreous china, wall mounted, with an automatic or a manual flushing system, and chromium-plated fittings.

(d) Wash-hand-basins

Wash-hand-basins shall be of white glazed vitreous china or enameled cast iron, wall mounted on a pair of cast-iron brackets, and fitted with chromium-plated fittings consisting of two taps, outlet and chain, and supplied with a plug and an anti-siphon trap.

(e) Sinks

Sinks shall comply with the requirements of SANS 242 and shall be complete with cabinet, chromium-plated outlet, anti-siphon trap, plug, chain and two bib taps or one mixer tap, all as detailed or as scheduled.

(f) Pipes and tubing

Cast-iron and steel pipes used in plumbing work shall comply with the requirements of SANS 746 and SANS 62 respectively. Copper tubing shall comply with the requirements of SANS 460 and malleable cast-iron fittings with SANS 14.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



C3.3.1.3.8.2 PD 08.2 CONSTRUCTION

Plumbing shall be carried out strictly in accordance with the Drawings and with the National Building Regulations, with specific reference to Government Notice R1875 dated 31 August 1979.

Steel pipes and their malleable cast-iron fittings shall be joined with red lead and hemp, lead pipes shall have wiped soldered joints, and cast-iron pipes shall be joined by caulking with hemp and metallic lead.

Soil pipes from WCs shall have an internal diameter of at least 100 mm and shall be fitted with a pan connector and an access bend (or an access junction where a vent pipe is used), and carried through walls and into the ground for connection to the sewer. Vent pipes shall be fitted with approved balloon gratings.

Waste pipes from basins and sinks shall have an internal diameter of at least 32 mm and shall discharge into gulleys. Bends for waste pipes shall incorporate cleaning eyes.

Cisterns, basins and sinks shall be connected to the pipe system with 12 mm diameter copper service pipes, and chromium-plated stopcocks shall be installed for isolation and maintenance purposes.

C3.3.1.3.9 PD 09 PAINTING

C3.3.1.3.9.1 PD 09.1 GENERAL

No paint shall be applied to any surface containing traces of dust, grit, grease, oil, loose rust, mill scale or corrosion products of any kind or to any surface that is not free from moisture. Where necessary, surfaces shall be thoroughly washed to remove all traces of soluble salts and/or corrosive air-borne contaminants prior to painting, and the surfaces shall be dried and painted immediately thereafter.

Welding shall be completed in so far as it is possible before painting commences, but in cases where welding can be done only at a later stage, no paint shall be applied to within 75 mm of the proposed weld position unless otherwise specified. Welds and adjacent parent metal shall be abrasive blasted and/or ground and all contaminants such as flux shall be removed prior to painting.

Surfaces of members which are to rest on concrete or other floors or which will be otherwise inaccessible after erection shall receive the full paint system prior to erection.

Damaged paint areas on metal surfaces shall be cleaned, rust spots removed where applicable and the surrounding paint which is still intact shall be feathered for a distance of 20 mm beyond the damaged area. Spot priming and repair shall consist of all the coats previously applied and shall overlap the damaged area.

Damaged galvanised areas shall be cleaned and any rust spots and any flakes of the coating surrounding the damaged area removed. The coating shall then be restored by zinc spraying or soldering, or painting with a zinc-rich paint, as may be approved by the Engineer.

Where the shop coat is allowed to age for a few months before the final painting is done, light sanding or rubbing with steel wool or scrubbing with clean water using a bristle brush shall be carried out.

Steel to be embedded in concrete shall not be painted below 50 mm from the final level of the concrete.

Each priming coat and each undercoat of paint shall be inspected and approved by the Engineer before any subsequent undercoat or finishing coat is applied.

All finishing colours shall be as shown on the drawings, or as directed by the Engineer.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



C3.3.1.3.9.2 PD 09.2 MATERIALS

Paints shall comply with the requirements of the appropriate specifications below:

- Painting of Structural Steel - EN ISO 12944
- Painting of Buildings - BS 6150
- Undercoats and Finishing Coats - BS 7664

The Contractor shall furnish the Engineer with the following information and details regarding the paints and decorative materials for the painting system he proposes to use, for written approval:

- (i) The name of the manufacturer and trade name
- (ii) The brand, type or grade of paint and the appropriate Specification
- (iii) Manufacturer's data sheets, colour references, instructions for use, including surface preparation, sealers, primers, undercoats, finishing coats, coat thicknesses and curing periods, which shall all be considered as being part of these Specifications if approved by the Engineer
- (iv) Safeguards to protect the applied paint from damage until the work is accepted by the Engineer
- (v) The shelf or pot life of materials, if applicable
- (vi) An undertaking that the proposed paint system is suitable for its intended use and that the various coats of paint are compatible with one another

Where proprietary brands are used, the manufacturer's priming and all subsequent coats of paint suitable for that particular brand shall be employed in accordance with the manufacturer's instructions.

No other materials of a similar nature and quality or from another manufacturer may be used instead of those approved, unless written permission to do so has been obtained from the Engineer.

All materials shall be brought onto the site in containers sealed by the manufacturer. Paints of a different quality, type, brand or colour shall not be mixed, or thinned and shall not be adulterated in any way, but shall be used as supplied by the manufacturer. Any mixing or tinting required shall be carried out by the manufacturer.

Tinting of paint on the site by the Contractor will only be allowed with the written permission of the manufacturer and the Engineer.

C3.3.1.3.9.3 PD 09.3 INSPECTION AND PRELIMINARY WORK

Before commencing paintwork, the Contractor shall carefully inspect the surfaces to be painted to satisfy himself that the surfaces are in a satisfactory or acceptable condition to receive the paint system specified.

All metal fittings and fastenings shall be removed where applicable before the preparatory processes are commenced. On completion, the metal fittings and fastenings shall be cleaned and refitted in position.

C3.3.1.3.9.4 PD 09.4 WORKMANSHIP AND FINISHES

Paint may be applied by spray, brush or roller depending on the materials used, the surface to be painted, and the manufacturer's instructions.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



Every coat of paint, irrespective of the method of application, shall be adequately and permanently keyed or bonded to the base material or previously applied coat, and shall be evenly distributed, continuous, free from sags, runs, brush marks, pin holes or other imperfections, and shall dry to a smooth finish.

An approved water trap and air-regulating valve shall be furnished and installed on all equipment used in spray painting.

Before painting the interiors of buildings they shall be cleaned and the floors shall be washed and kept free from dust during the progress of the interior work.

The Contractor shall protect all nearby surfaces against disfigurement by spatters, splashes and smirches of paint or paint materials. The Contractor shall be responsible for any damage by paint or dirt caused by his operations to vehicles or property or injury to persons and he will be required to provide protective measures to prevent any such damage or injury and make good, where required, at his own expense.

If passing traffic creates dust which may harm or spoil the appearance of external painted surfaces, the Contractor shall sprinkle the adjacent areas with water, at his own cost, for a sufficient distance on each side of the location where painting is being done.

Undercoats shall be tinted by the manufacturer to distinguish between successive coats.

The final coats or finishing coats of paint shall be applied after all the other work in the vicinity has been completed.

The painter shall keep some of the final paint in reserve in the event of his having to make good any patching which may be required as a result of damage or unforeseen circumstances.

Upon completion, the Contractor shall, in the case of buildings, clean all glass, remove all paint spots from walls, floors and fittings, and leave the premises clean and fit for occupation.

All inflammable materials, comprising solvents, thinners, wiping cloths, etc., shall be placed in tightly closed containers and properly disposed of.

C3.3.1.3.9.5 PD 09.5 PAINTING OF PLASTER, CONCRETE OR BRICK SURFACES

(a) Surface preparation

Surfaces for painting shall be prepared by sandpapering, scraping or wire-brushing to remove loose material, dust, laitance, scum or other deleterious materials or high spots. Defective areas shall be cut out where necessary and made good with an approved non-shrink filler. Cracks shall be cut out, suitably keyed, and given a coat of an approved bonding agent before the filler is applied. All patches shall be rubbed down to an even surface. Surfaces shall be washed and allowed to dry.

Surfaces shall be treated with neutralising liquid for walls, and if the surface is coarse or textured, either one full coat of pigmented wall sealer or one full filler coat shall be applied in addition to the neutralising liquid.

(b) Paint application

Prior to the emulsion paint being applied, the surface shall be sealed with an approved clear sealer and primed with an undercoat diluted to 50%. Emulsion paint (PVA or acrylic) shall then be applied in two finishing coats.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



Egg-shell finish (alkyd oil-based), oil gloss paint or enamel gloss paint shall be applied as follows: one coat of universal undercoat shall be applied and it shall be followed by one coat of a mixture comprising 50% of the undercoat and 50% of the paint to be used for the finishing coat. A finishing coat of semi-gloss egg-shell, or oil gloss paint or enamel gloss paint shall then be applied.

C3.3.1.3.9.6 PD 09.6 PAINTING OF WOODWORK

(a) Surface preparation

The surfaces shall be cleaned, sandpapered and rubbed down to a smooth, even face before painting. The moisture content of the timber shall not be more than 20% at the time when the first coat is applied. All cracks, shakes or scars shall be filled flush with a filler approved by the Engineer before painting. The surface shall then be washed with cleaner and allowed to dry.

(b) Primer application

One coat of an approved wood primer shall be applied.

After open-grained timber has been prepared and primed, the grain shall be stopped and filled with synthetic filler and rubbed down with water paper.

All new woodwork shall be properly primed on all surfaces and edges before being fixed in position. All woodwork not previously painted shall be given a prime coat, well brushed in.

(c) Paint application

One coat of universal undercoat shall be applied followed by one coat of a mixture of 50% of the undercoat and 50% of the paint to be used for the finishing coat. A finishing coat of oil gloss paint or enamel gloss paint or semi-gloss egg-shell (alkyd oil-based) paint shall then be applied.

(d) Varnish finish

Two coats of gloss varnish or egg-shell varnish shall be prepared, stopped and applied.

C3.3.1.3.9.7 PD 09.7 PAINTING OF METAL SURFACES

(a) General

Wherever possible, all painting shall be done at the manufacturer's works, but where this is not feasible, the Engineer may permit the application of the undercoat and finishing coats to be carried out on the Site, in which case a prime coat shall be applied at the manufacturer's works prior to the members being dispatched to the Works.

(b) Surface preparation

The preparation of metal surfaces shall comply with SANS Code of Practice 10064 and shall receive the greatest care to ensure rust-free conditions prior to the paint system being applied.

All surfaces shall be prepared by removing loose paint, rust, plaster, scale, dust, dirt, grease, etc. and by repairing or patching defective paint surfaces before painting or repainting. Damaged shop-primed surfaces shall be thoroughly cleaned of rust and patched with a prime coat.

(c) Paint application

(i) Iron and steel work

All iron and steel work shall be properly primed with a red-lead-based primer where steel work is likely to be exposed to the elements for longer than 30 days. Zinc-chromate primer may be used

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
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where overpainting will be completed within 30 days of priming. Metal-etch wash primers may be used under dry conditions where overpainting will be completed within 24 hours of priming. The dry-film thickness of the prime coat shall not be less than 0,300 mm.

After priming, one coat of universal undercoat shall be applied. If necessary, the undercoat shall be tinted to a shade just lighter than the desired finish with approved liquid stainers. The dry-film thickness shall not be less than 0,250 mm.

The two finishing coats shall either be of alkyd resin-based synthetic enamel, gloss or matt oil paint, or as specified elsewhere. The dry-film thickness shall not be less than 0,250 mm per coat.

When mating surfaces are brought together, both surfaces shall have been given the full treatment specified, but where this cannot be done, each surface shall be given a copious coating of primer and the surfaces drawn together while the paint is still wet.

The portion of structural steel members to be buried in soil, and all bases to a height of 500 mm shall be given two coats of an epoxy-tar primer instead of the zinc-chromate primer specified for other surfaces.

The surfaces of steel and cast-iron articles, such as floor gratings, grids and manhole covers, shall, after a thorough brushing to remove loose rust, be painted with two coats of epoxy-tar paint, each at least 0,230 mm thick.

(ii) Galvanized iron and steel

All traces of protective coating shall be removed with galvanized iron cleaner, and two coats of calcium plumbate primer shall be applied. One coat of tinted universal undercoat and two finishing coats of alkyd resin-based synthetic enamel gloss paint shall be applied.

(iii) Non-ferrous metals

Surfaces of aluminium, copper, etc. shall be prepared and cleaned, and one coat of self-etch zinc-chromate wash primer shall be applied. One coat of universal tinted undercoat and two finishing coats of enamel gloss paint shall then be applied. Where non-ferrous metals are not to be painted, the surfaces shall be cleaned, polished and two coats of lacquer applied.

C3.3.1.3.9.8 PD 09.8 PAINTING OF FLOOR SCREEDS

Where chemicals could cause damage to floors, such floors shall be painted with an approved epoxy paint. The type of paint to be used will be shown on the drawings and will depend on the types of chemical that are used.

The preparation of such floor screeds for painting and the subsequent application of paints shall be carried out strictly in accordance with the manufacturer's instructions.

C3.3.1.3.9.9 PD 09.9 PAINT THICKNESS

Unless otherwise specified, all coats of paint, whether prime coat, undercoat or finishing coat, shall have a dry-film thickness of not less than 0,200 mm, irrespective of the method of application.

C3.3.1.3.9.10 PD 09.10 INSPECTION

The Contractor shall provide the necessary equipment to establish whether the primers, undercoats and finishing coats have been applied to the correct thickness according to the correct applications. The Engineer may take samples of the paints during painting operations for testing and quality control.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



C3.3.1.3.10 PD 10 MEASUREMENT AND PAYMENT

C3.3.1.3.10.1 PD 10.01 Brickwork:

(a) (Thickness, type, and class indicated) Unit: m²

(b) Etc. for other thicknesses, types and classes

The unit of measurement shall be the square metre of each type of brickwork built, calculated from the leading dimensions of the brickwork. Areas of pipes, etc. built into brickwork shall not be included in the areas measured. At corners and intersections common to more than one brick wall, the areas shall be measured only once.

The tendered rates shall include full compensation for the construction of the brickwork complete as specified, including pointing, the building-in of conduits, beams, lintels, pipe sleeves, doors, windows, the raking-out of joints, damp-proof course, brickforce reinforced as specified, etc.

C3.3.1.3.10.2 PD 10.02 Plaster work:

(a) (Thickness of plaster and finish indicated) Unit: m²

(b) Etc. for other thicknesses and finishes

The unit of measurement shall be the square metre of each type of coat completed as specified.

The tendered rates shall include full compensation for the construction of the plaster work, including supplying all materials, mixing, applying, finishing, forming reveals, joints, narrow widths, rounded angles, V-joints, etc. complete as specified.

C3.3.1.3.10.3 PD 10.03 Floor screeds:

(a) (Description and thickness indicated) Unit: m²

(b) Etc. for other thicknesses

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

The tendered rates shall include full compensation for constructing the floor screeds, including supplying all materials, mixing, laying, finishing, and forming nosings, reedings, skirtings, etc.

C3.3.1.3.10.4 PD 10.04 Doors and windows:

(a) (Type and size indicated) Unit: number

(b) Etc. for other types and sizes

The unit of measurement shall be the number of doors and windows installed complete as specified.

The tendered rates shall include full compensation for manufacturing and installing steel doors, powder-coated aluminium windows, and frames complete with hinges, handles, industrial-type locks, barrel bolts, retaining devices, door stops, stays and any other work necessary to complete the work as specified or as shown on the drawings. The tendered rate for windows shall also include full compensation for glazing, window sills as specified, and damp-proof sheeting.

C3.3.1.3.10.5 PD 10.05 Structural timber:

(a) Plates (sizes indicated) Unit: m

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
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- (b) Beams (sizes indicated) Unit: m
- (c) Joists (sizes indicated).....Unit: m
- (d) Rafters (sizes indicated) Unit: m
- (e) Purlins (sizes indicated) Unit: m
- (f) Roof trusses complete (drawing number indicated) Unit: number
- (g) Roof truss system complete (drawing number indicated) Unit: Sum

The unit of measurement shall be the metre of individual types of timber element or the number of complete trusses installed.

The tendered rates shall include full compensation for supplying all materials and manufacturing, cutting, wasting, jointing and installing the timber as shown on the drawings.

C3.3.1.3.10.6 PD 10.06 Ceilings:

- (a) Plaster-board ceiling (type and thickness indicated):
- (i) Fixed ceiling.....Unit: m²
- (ii) Suspended ceiling.....Unit: m²
- (b) Fibre-cement ceiling (thickness indicated):
- (i) Fixed ceiling.....Unit: m²
- (ii) Suspended ceiling.....Unit: m²

The unit of measurement shall be the square metre of fixed or suspended ceiling installed complete as scheduled.

The tendered rates shall also include full compensation for the construction of the ceilings, including the exposed tees, insulation blanket and bracing as specified, as well as the suspension system where applicable.

C3.3.1.3.10.7 PD 10.07 Joinery:

- (a) Items measured by number:
- (i) Doors (type and size indicated).....Unit: number
- (ii) Etc. for other items measured by number
- (b) Items measured by length:
- (i) Skirtings (type and size indicated).....Unit: m
- (ii) Etc. for other items measured by length

The units of measurement shall be the metre of each type and/or size of joinery item specified.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



The tendered rates shall include full compensation for supplying all materials, and manufacturing, cutting, wasting, fixing and installing the joinery items.

C3.3.1.3.10.8 PD 10.08 Miscellaneous work:

- (a) Paintwork.....Unit: sum
- (b) Plumbing.....Unit: sum
- (c) Electrical work.....Unit: sum

The tendered sums shall include full compensation for the supply of all materials, for transport, storage, all equipment and labour, all temporary work and safety precautions, replacement of defective work, protection of completed work and clean-up after completion.

C3.3.1.3.10.9 PD 10.09 Miscellaneous items:

- (a) Items measured by number:
- (i) (Description of item).....Unit: number
- (ii) Etc.
- (b) Items measured by length:
- (i) (Description of item).....Unit: metre (m)
- (ii) Etc.
- (c) Items measured by area:
- (i) (Description of item).....Unit: square metre (m²)
- (ii) Etc.

The unit of measurement shall be the number, linear metro and square metre as applicable to each item.

The tendered rates shall include full compensation for all labour, plant, equipment, transport, etc., manufacturing or providing and installing each item complete as scheduled and shown on the drawings, and shall include all corrosion protection where applicable.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
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Building Upgrade for the Mega Warehouse
In Langlaagte Depot
Particular Specifications



ELECTRICAL

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

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



E200 STANDARD ELECTRICAL LOW VOLTAGE SPECIFICATION

C3.3.4.2.1 E100.1 GENERAL DESIGN

C3.3.4.2.1.1 E100.1.1 SCOPE

This standard specification covers general design criteria and standards applicable to all sections of work. Should the requirements of this standard specification conflict with any other standard specification or the detail specification, the other standard specification or detail specification shall govern, and the Tenderer/Contractor shall seek information of such precedence from the Engineer. All items covered in this specification may not necessarily be applicable to this project.

C3.3.4.2.1.2 E100.1.2 DESIGN

- a) The works shall be designed to facilitate easy accessibility, equipment replacement, maintenance, handling, inspection cleaning and repairs and to ensure satisfactory operation in which safety of plant, personnel and public and continuity of service is the first consideration.
- b) All plant, equipment and apparatus shall operate satisfactory under the ambient and other conditions prevailing at the site.
- c) All apparatus shall be designed to prevent the risk of accidental short circuits due to animals, birds, ants and vermin.
- d) All moving, rubbing or wearing surfaces shall be machined or ground where they bear upon each other.
- e) The plant and equipment shall be designed and constructed to keep maintenance costs and the number of persons employed for maintenance to a minimum.
- f) All the equipment shall be to the approval of the Engineer and shall, unless otherwise specified, be suitably designed for operation on normal electrical supply systems, with voltage fluctuations of plus and minus 10% and under such sudden variations of load and voltage as may be met with under working conditions.
- g) The design of equipment shall include as a major consideration the absolute safety of the general public, operating and maintenance personnel.
- h) All dimensions, units and design parameters shall be in accordance with the international metric (SI) system.

C3.3.4.2.1.3 E100.1.3 STANDARDS

- a) All electrical equipment shall be of approved manufacture and its construction, design and testing shall be in accordance with the requirements of the most recent South African, British Standards or IEC publications including all amendments issued thereto up to the date of tender. The installation and equipment shall also comply with the relevant clauses of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993), and the regulations promulgated in terms of the Act, and with the Code of Practice for The Wiring of Premises, SANS 10142-1.
- b) Notwithstanding reference in this specification to South African or British Standards and IEC or ISO recommendations the supplier may submit for approval material and designs conforming to other technically equivalent national standards, provided that the supplier supplies the Engineer with a translation of the standards into English and satisfactory proof of actual compliance therewith.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
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C3.3.4.2.1.4 E100.1.4 QUALITY OF MATERIAL

All material shall be new and of a design and class suitable for working under the conditions specified, and shall withstand the variations of temperature and atmospheric conditions arising under working conditions without distortion, deterioration, or the setting up of undue stresses in any part such as to affect the efficiency and reliability of the plant and also without affecting the strength and suitability of the various parts for the duty which they have to perform.

C3.3.4.2.1.5 E100.1.5 INTERCHANGEABILITY

Corresponding parts throughout the works shall be made to such close tolerances that all similar components and spares shall be fully interchangeable without any further alterations or adjustments being necessary.

C3.3.4.2.1.6 E100.1.6 BOLTS AND NUTS

- The threads of all bolts, nuts and studs shall be in accordance with SABS 135.
- No brass bolt or stud shall have a diameter of less than 6 mm.
- All nuts and studs shall be locked in position by lock washers and where necessary, lock nuts.
- Each bolt shall protrude by at least one but not more than five threads through the nut with all washers in position.
- All bolts, nuts and washers used outdoors shall be of approved materials and treated to prevent corrosion of the threads.
- The Contractor shall provide special tools if any bolt, nut, screw or other fastener is used in a position, which is not accessible using conventional tools. This also applies where the size or shape of the fastener is not conventional.

C3.3.4.2.1.7 E100.1.7 FIRE PRECAUTIONS

All apparatus, connections and cabling shall be designed and arranged to minimize the risk of fire and any damage, which might be caused in the event of fire.

C3.3.4.2.1.8 E100.1.8 GALVANISING

- Where galvanizing is specified, or is a requirement of the design, such galvanizing shall be performed by the hot-dip process to SANS 121:2000.
- For all parts, other than wires, the equivalent zinc coating thickness shall not be less than 455 g of zinc per square metre of surface area.
- The galvanising must be clean, smooth, of uniform thickness, unblemished and free from defects.
- The preparation for galvanising and the galvanising itself shall not adversely affect the mechanical properties of the coated material.
- All drilling, welding, cutting, sawing, punching, filing and bending shall be complete and the metal shall be cleaned of any machining blemishes, mill scale, rust and lubricants, before galvanising.
- Galvanised areas must be kept free of lubricants. Surfaces which are in contact with oil shall not be galvanised or cadmium plated.
- Electrolytic deposition of zinc is not acceptable.

Employer:		Contractor:	
Witness:		Witness:	

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- h) Where it is not practicable to coat the surface of metal by the hot-dip galvanising process, such equipment may be zinc-sprayed instead. The surface being zinc-sprayed shall be suitably prepared in accordance with the requirements of the process adopted and the rate of deposition of zinc shall not be less than 760 g per square metre of surface area. After zinc spraying the surface shall be painted with a suitable paint to render it completely impervious.

C3.3.4.2.1.9 E100.1.9 WELDING

- a) All welding shall comply with the appropriate international standards such as BS 1856 (General specification) and BS 709 (methods of testing).
- b) The welding shall be executed in accordance with modern accepted practice for welding and shall be sound, full strength and free from undercut and slag inclusions. Crater effects at the ends of weld runs shall be eliminated.
- c) Intermittent welding and incomplete penetration butt-welding will not be accepted.
- d) All fabricated items shall be stress relieved after welding.
- e) The supplier shall well in advance of the commencement of fabrication, submit for approval details of proposed welding procedures.

C3.3.4.2.1.10 E100.1.10 ELECTROMAGNETIC INTERFERENCE

- a) All equipment installed under this contract shall comply with the requirements of IEC 61000 Parts 1 to 6 Electromagnetic Compatibility (EMC).
- b) Any equipment found producing Electromagnetic interference subsequent to commissioning, shall be suppressed or replaced to the satisfaction of the Engineer without any cost to the Employer.

C3.3.4.2.1.11 E100.1.11 LABELS AND NOTICES

- a) Identification labels must be attached to all equipment, motors, control gear and all panels and the equipment contained therein.
- b) All labels and plates shall be of an approved non-corrosive material and shall be fixed with stainless steel or nickel-plated screws of ISO metric thread form.
- c) Labels shall have a matt or satin finish to minimise reflection.
- d) Labels shall have black lettering on a white background. Danger plates shall have white lettering on a red background.
- e) Cables shall be labelled at both ends, at through joints and at regular intervals.
- f) Cables shall be labelled on both sides of the place where the cable passes through a permanent obstruction.
- g) For outdoor applications labels shall be of aluminium, with letters filled in black, lightly sanded with fine grit paper and clear lacquered.
- h) All lettering shall be in uppercase letters except where standard abbreviations of units are used, e.g. kWh, kVA, etc.
- i) The wording of labels and character height shall be to the approval of the Engineer.
- j) All labels shall be in English. In addition to the English text, all Warning/Danger labels shall also be in the regional indigenous language.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



C3.3.4.2.1.12 E100.1.12 CLEANING AND PAINTING

- a) The cleaning and painting of all exposed surfaces of all plant and accessories, unless otherwise specified or approved, shall be carried out as follows:
 - Surface preparation
All metal work shall be thoroughly cleaned by blast cleaning or pickling, to be free of all mill scale, dirt, rust, welding slag and spatter, grease and all other contaminants and to present a dry, bright metallic finish.
 - Priming
The metal work shall be primed with an approved primer which, for equipment intended for outdoor use, shall be red lead based and for indoor mounted equipment shall be phosphate based.
 - Finishing
The primed surfaces shall be finished with a minimum of two coats of approved alkyd-based enamel of which each coat shall be of a different shade.
- b) Epoxy powder coating will be considered as alternative, for indoor applications, subject to the approval of the application procedure by the Engineer.
- c) Top and bottom plates of chassis compartments assemblies and chassis runners may be protected against corrosion in an alternative approved manner (e.g. by passivated cadmium plating) due to the likelihood of damage to paint work on removal and replacement.
- d) All painting shall be spray applied using dry oil-free air.
- e) The final paint thickness shall be not less than 0,1 mm as determined by a magnetic film thickness gauge.

C3.3.4.2.1.13 E100.1.13 WATER AND DEBRIS ACCUMULATION

All outdoor equipment must be designed so that water and debris will not readily accumulate to cause deterioration of equipment or an electrical discharge hazard. Where this cannot be avoided such places shall be easily accessible for cleaning.

C3.3.4.2.1.14 E100.1.14 INSPECTION AND TESTS

- a) All equipment will be inspected and tested, both in the factory during manufacturing and on site during installation. The tests required are prescribed in the standard and detail specification. The Engineer will do all inspections accompanied by the Contractor and the Contractor shall perform all tests with the Engineer as witness.
- b) The Engineer will require seven (7) days notification to avail himself for any tests or inspection. The Contractor shall arrange for the maximum number of tests and inspections to be done on the same day.
- c) The Contractor shall provide all testing facilities and instruments and all equipment and labour required for a test or inspection. All instruments shall be adequately scaled for the application. All testing facilities and instruments remain the property of the Contractor.
- d) All instruments used shall have a valid test certificate issued by an accepted testing authority. The Engineer reserves the right to call for a calibration test on any instruments used during the test.
- e) The Contractor shall ensure that the equipment is ready for testing or inspection and that the equipment conforms to the specifications before the Engineer is requested to witness tests or inspections. Should it be found that the equipment or contract works is not ready

Employer:		Contractor:	
Witness:		Witness:	

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for testing/inspection, or does not conform to the specification, the Engineer reserves the right to charge the Contractor for any re-tests or subsequent costs.

- f) On satisfactory completion of the commissioning and inspections the contractor shall test the entire installation, as per SANS 10142-1 requirements.
- g) The contractor shall issue a Certificate of Compliance to the engineer, upon successful completion of the installation test.

C3.3.4.2.2 E100.2 GENERAL DESIGN

C3.3.4.2.2.1 E100.2.1 SCOPE

This section covers the factory and on-site testing and commissioning requirements for all equipment supplied and installed under this contract. The procedures described are the minimum required and additional tests/requirements are specified in the relevant standard and detail specifications.

C3.3.4.2.2.2 E100.2.2 TESTING SEQUENCE

- a) The testing to be performed on site is divided into two sections as follows:
 - Before official commissioning commences the Contractor shall test his equipment as described below to ensure that the plant has been installed correctly.
 - After the Contractor has been satisfied that his equipment is in running order, the commissioning of the plant will commence as described below.

C3.3.4.2.2.3 E100.2.3 SITE TESTING OF EQUIPMENT PRIOR TO COMMISSIONING

- a) The Contractor shall timeously inform the Engineer when he intends to perform his first tests and start-up of equipment in order to allow a representative of the Engineer to witness the tests.
 - Before starting up any section of the mechanical plant or filling tanks and sumps with liquid, the Contractor shall clean out the tanks, pipes, fittings, equipment or structures, and, if necessary, make arrangements with other Contractors to remove their building rubble from the structures, check that all safety devices and alarms have been set and activated, all nuts have been tightened correctly, that all the equipment is complete and ready for start-up, that the plant has been installed correctly, and that three copies of the operating manuals have been handed over to the Engineer.
 - Each section of the equipment shall be started up by the Contractor, who shall ensure that all oil fillings, lubrication, vibration monitoring, etc., have been correctly completed. In addition, he shall be responsible for the first re-filling of all the lubricating oils as well as for adjusting the plant to operate according to specification. Before any equipment is started or energized, the Contractor shall ensure that it is safe for personnel and equipment on site to do so. Allowance for these costs shall be made in his tendered rates and sums.
 - The Contractor shall conduct his own tests on the equipment and, only when he is satisfied that these tests meet the requirements of the specifications, shall he notify the Engineer that he is ready to conduct the official tests on completion. The Contractor shall not conduct an official test without the Engineer being present or his approval to do so. All equipment tested shall conform to the requirements specified.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



C3.3.4.2.2.4 E100.2.4 COMMISSIONING

- a) The Contractor shall be responsible for commissioning all sections of the works and shall perform all the tasks set out below:
 - Prior notice of and proper arrangements for the commissioning shall be made with the Employer, Engineer, supply authority, and all electrical Contractors and suppliers of equipment, which will be affected by the commissioning operation.
 - If plant and equipment, which has been supplied by others has to be commissioned, the supplier's specific permission thereto, together with any specific requirements relating to commissioning shall be obtained prior to commissioning.
 - All sections of the works shall be carefully inspected by a responsible representative of the Contractor to ensure that all construction and installation work has been properly completed.
- b) Commissioning and testing on site shall be carried out by experienced personnel under the Contractor's supervision.
- c) All pre-commissioning tests and checks shall be agreed with the Engineer prior to the commencement therewith.
- d) When all the tests required before commissioning, or tests before tests on completion, have been completed and accepted by the Engineer, the commissioning may proceed. The commissioning period shall be undertaken over a trouble-free period of at least thirty consecutive calendar days. During this period the Contractor shall instruct the operating staff in the correct procedures of operating the plant under all circumstances of operation, including emergency conditions, the correct servicing of every part, the type of oil or grease to be used, and similar instructions. This shall be done by demonstration and confirmation in writing and operating manuals shall be referred to for this purpose.
- e) At least four weeks before commissioning commences the Engineer will be requested to provide the Contractor with commissioning sheets for all the equipment installed by the Contractor. These forms shall be completed by the Contractor during the commissioning period and all items listed shall be entered. Final hand-over certificates will not be issued for equipment with incomplete commissioning reports. Information that is not available or applicable, or reasons for not performing certain tests shall be agreed with the Engineer.
- f) The thirty-day commissioning period will commence with a day-one test and terminate with a day-thirty test in compliance with the commissioning report. Commissioning of the plant (which includes the thirty days between the day-one and day-thirty tests) shall include operating under conditions which shall adequately prove that all the specifications are met. All safety devices, stand-by plant, automatic controls and protection devices shall be adequately tested for reliability and correct functioning. The Contractor may be called upon to repeat testing during the maintenance period if the performance of any equipment supplied under this contract is suspected to be substandard by the Engineer. Such tests shall be for the Contractor's account and shall comply with the requirements specified. Copies of updated commissioning reports shall be provided to the Engineer within two days after a test has been performed.
- g) After the Contractor has provided training to the Employer and provided all other contractual requirements have been met, the latter will sign the commissioning report.
- h) Once a commissioning report is complete, the Engineer and the Contractor will sign and date the report, whereupon the Engineer will notify the Employer that maintenance for that particular piece of equipment from then on is the Employers responsibility in compliance with the general conditions of contract.
- i) Programs for the day-one tests, day-thirty tests and instruction/training sessions with the client shall be prepared by the Contractor and provided to the Engineer no less than two weeks before

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



the commissioning period commences. Weekly updates to these schedules shall be provided by the Contractor for the duration of the commissioning period.

- j) Note that if any equipment should fail during the 30-day commissioning period, the equipment shall be repaired or replaced by the Contractor and testing and commissioning will commence from scratch.
- k) During the thirty-day commissioning period, the Contractor shall be responsible for providing all labour and materials (including testing equipment) and shall carry out all the servicing and any adjustment of the plant required for ensuring that it operates as specified. Valid calibration certificates shall be available for all testing equipment on site during the commissioning period.
- l) The Contractor shall conduct all the tests required to satisfy the Engineer that the plant is capable of performing in accordance with the specification and shall make allowance therefore in his tendered rates and prices. Any defects detected during the commissioning period shall be made good, by and at the expense of the Contractor, including all additional costs incurred by the Employer and his representatives and the Engineer. These tests shall be conducted to certify that the plant, as installed, is operating in accordance with the specified requirements. Note that all equipment will be tested as part of a system, where appropriate, and will not be passed if all protection devices, interlocking with other equipment, etc., are not fully functional.
- m) On satisfactory completion of the commissioning and inspections the contractor shall test the entire installation, as per SANS 10142-1 requirements.
- n) The contractor shall issue a Certificate of Compliance to the engineer, upon successful completion of the installation test.

C3.3.4.2.2.5 E100.2.5 MEASUREMENT AND PAYMENT

- a) All costs for equipment, labour and other expenses for the on-site testing and commissioning of equipment shall be included in the tendered rates set out in the measurement and payment clauses of each piece of equipment and in the schedule of quantities. Any additional tests specified in the standard and detail specifications shall also be included in the tendered rates.

C3.3.4.2.3 E100.3 LOW VOLTAGE CABLES

C3.3.4.2.3.1 E100.3.1 SCOPE

- a) Application
 - This document specifies the standard requirements for the supply, delivery to site, site installation, site testing, commissioning and handover of Low Voltage cable systems.
 - This document specifies the standard requirements for the design, installation, testing and commissioning of electrical installations operating on voltages up to 1 000 volts AC / 1 500 Volts DC.
 - The primary intention of this specification is to ensure the provision of an electrical installation, which has been designed and constructed to ensure safe, reliable, operation and to facilitate safe inspection, testing and maintenance.
 - Note, however, that this specification only covers such installations (or sections of installations) that are covered by SANS 10142-1. Note also that certain provisions of this specification are inappropriate for direct application to installations where additional measures (such as earthing, intrinsic safe equipment, etc.) are required by SANS 10142-1 and SANS 10108 (i.e. medical and hazardous locations). For these types of installations, SANS 1411.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



b) Electrical System Characteristics

- The design of the installation shall comply with SANS 10142-1.
- The design of the installation shall consider the following supply characteristics:
 - Voltage, frequency and number of phases
 - Maximum prospective short circuit current (phase to phase and phase to neutral)
 - Type of system, e.g. TN-S, TN-C-S
 - Maximum earth loop impedance of the earth fault path external to the installation
 - Type and rating of the cut-out or switch device
 - Load capability of the supply source, particularly the effects on the supply voltage of the starting of new equipment
- c) The installation of protective devices shall be correctly co-ordinated within the installation and with respect to existing installations. Discrimination studies shall be performed to validate the co-ordination of the installation.
- d) All equipment which requires operation or attendance by a person, or requires cleaning or maintenance in service, shall be constructed and installed to allow adequate and safe means of access and adequate working space for such activities.
- e) Where additions or alterations to an existing installation are to be performed, the rating and condition of existing equipment, including that associated with the supply, shall be verified to confirm its suitability to carry any additional load. The earthing and equipotential bonding arrangements shall also be verified. No addition or alteration shall have an adverse effect on the existing installation.

C3.3.4.2.3.2 E100.3.2 STANDARDS

a) Associated Documentation

- This Specification identifies the Employer's standard modifications and requirements which shall be applied to the statutory and recognised standards. The detailed specification of the project or site-specific requirements will be found in the Particular Specification and its accompanying Technical Data Sheets, which shall be read in conjunction with this Specification.
- Any items not specifically detailed in this Specification, which are necessary to provide a safe and fully operational working system, shall be deemed to be included.
- The Contractor shall operate an auditable quality assurance procedure covering the design, construction, inspection and testing of the installation.

b) Regulations, Specifications and Standards

- The design, construction, inspection and testing of the installation shall comply with all relevant Statutory Regulations and Directives including:
 - Occupational Health and Safety Act (Act 85 of 1993)
 - Construction Regulations 2003 issued in terms of Section 43 of the Act

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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- Local Fire Regulations; and
- Regulations of the Local Supply Authority

and the latest editions (current at the time of Tender) of all relevant South African National Standards, as well as International Standards, including but not limited to:

Table 1 Section 3: Reference Standards

Standard Number	Description
SANS 1213	Mechanical cable glands
SANS 1411	Materials of insulated electric cables and flexible cords
SANS 1507	Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V)
SANS 10199	The design and installation of earth electrodes
SANS 10225	The design and construction of lighting masts
SANS 10142-1	Wiring of Premises Part 1: Low Voltage Installations
SANS 60614-2	Conduits for electrical installations - Particular specification for conduits
IEC 50086	Conduit systems for cable management

- The installation shall also comply with:
 - This Specification, including all Technical Data Sheets; and
 - Any documentation issued by, or on behalf of, the Employer in respect of the Installation

C3.3.4.2.3.3 E100.3.3 GENERAL

a) General

- Cables shall be manufactured strictly in accordance with SANS 1507.
- Cables shall be delivered within 12 months of manufacture and shall be delivered to site on cable drums or coiled with protective wrappings.
- Cables shall be delivered, stored and handled in accordance with the manufacturer's instructions. Where the performance of the cable is likely to be adversely affected by the ingress of moisture, it shall be adequately sealed at both ends.
- The end protruding from the drum shall be protected against mechanical damage.
- Cable selection and sizing should comply with SANS 10142-1. Cables and their wireways shall, where required by SANS 10400 Part T to be protected against the effects of fire, be selected and installed in accordance with the provisions of such code.
- Cables shall have copper or aluminium conductors according to SANS 1411-1. Cores of cross-sectional area greater than 1,5 mm² shall be stranded or flexible.
- Where neutral conductors are to be provided, they shall be of the same cross-sectional area as the associated phase conductor, unless otherwise specified in the Particular Specification and drawings.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



C3.3.4.2.3.4 E100.3.4 LOW VOLTAGE CABLES

a) Types of Low Voltage Cables

- Unless otherwise specified, all LV cables shall have copper conductors to SANS 1411-1. Cores of cross-sectional area greater than 1,5 mm² shall be stranded or flexible. Where neutral conductors are to be provided, they shall be of the same cross-sectional area as the associated phase conductor, unless otherwise specified in the design documentation and drawings.
- All LV cables used in an electrical installation shall be as specified in the Particular Specification (or cable schedule as part of the Particular Specification) and shall comply with either of the following:
 - PVC/AWA/PVC and PVC/SWA/PVC
 - Cables shall comply with SANS 1507-3 and be rated at 600/1000 V.
 - Single core cables shall have aluminium wire armouring.
 - Multicore cables comprising five conductors and above shall have each core individually coloured, or, where not available, be coloured white with phase identification in black numerals.
 - XLPE/AWA/PVC and XLPE/SWA/PVC
 - Cables shall comply with SANS 1507-4 and be rated at 600/1000 V.
 - Single core cables shall have aluminium wire armouring.
 - PVC/PVC
 - Cables shall comply with SANS 1507-3 and be rated at 600/1000 V.
 - XLPE/PVC
 - Cables shall comply with SANS 1507-4, and be rated at 600/100 V.
 - Single Core PVC
 - Cables shall comply with SANS 1507-2 and be rated at 600/1000 V.
 - The insulation shall be phase coloured, and, where used in single phase systems, line cables shall be red, neutral cables black and earth cables yellow and green.
 - Flat Twin and Earth PVC
 - Copper conductors shall comply with SANS 1411-1, PVC insulated to SANS 1411-2, laid up with a bare copper earth continuity conductor between them, with PVC bedding to SANS 1411-2.
 - Cables shall be rated at 300/500 V.
 - Fire Resistant Cables
 - Cables requiring protection against the effects of fire shall be of fire-resistant construction (note here that “fire-rated” cables are not the same as “fire-resistant” cables).

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Fire-resistant cables shall thus comply with SANS 60331-21 and / or BS EN 50200.
- Except where prior approval in this regard has been granted by the Engineer, increasing the resistance to fire of normal (i.e. non-fire resistant) cables though the application of a coat of fire-resistant compound will not be accepted.

b) Cable Accessories

– Cable Markers

Concrete markers for the indication of cable or trench routes shall be placed at a minimum of 50 m intervals, changes in trench or cable direction and at road crossings. The markers shall protrude by 25 mm above finished ground level, except where they are likely to cause obstruction, when they shall be laid flush with the finished ground level.

C3.3.4.2.3.5 E100.3.5 INSTALLATION OF CABLES

a) General

- The cable installation shall comply with the requirements of SANS 10142-1.
- Cables shall be installed strictly in accordance with the cable route drawings.
- Cables installed in groups shall run in straight lines and not cross over each other, except where transposing of cables is required to reduce capacitive or inductive effects.
- Cables installed above ground shall, as far as possible, run parallel with the lines of building construction. Cables and wireways shall then only be installed in horizontal and vertical runs, and the installation shall be as visually unobtrusive as possible.
- Cables buried below ground shall, as far as possible, follow features of the site such as roadways and building lines.
- Where a redundant cable installation is required, the cables shall not be installed along the same route, and their routes shall be through separate fire compartments (except where no separation occurs, as may be the case in the vicinity of the source and load).
- Cables and their support systems shall not be fixed to protective barriers, guards or directly to guard-rails.
- Cables shall not be exposed to direct sunlight after installation. If the cable route compels the support system to be in direct sunlight, the Contractor shall ensure cables are covered with a suitable canopy or cover of the same material as the support system (tray). Cables shall be installed strictly according to the manufacturer's requirements pertaining to:
 - Maximum tensile or compressive stresses (e.g. due to pinching or squashing)
 - Minimum bending radii
 - Temperature of installation; and
 - Operating environment
- No joints or repairs to outer sheathings or insulation shall be allowed in low-voltage cables without the prior approval of the Engineer.
- Propriety (i.e. suited to and manufactured for such use) cable support systems shall be used.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Unarmoured cables shall only be used where there is no risk of mechanical damage.
- Fire resistant cables shall only be supported by fire resistant cable support systems.
- After cable installation, the open end of all cable sleeves and the openings in building structures specifically provided for the passage of cables (including unused openings) shall be fire sealed to SANS 10177 Part 2, thus preventing the ingress of harmful or flammable gases, liquid, smoke, fire and vermin.

b) Separation of Cables

- Cables shall be classified as follows:

Table 2: Cable classification

	AC	DC
High Voltage	> 1000 Vrms	> 1500 V
Low voltage (power, control, small power and lighting)	50–1000 Vrms	120–1500 V
Extra-low voltage (signal/instrument, data transmission and telecommunication)	< 50 Vrms	< 120 V

- Except for reasons of electromagnetic compatibility, where larger separation will be required, the minimum separation distance between cables of different classifications shall be according to the following table.

Table 3: Separation distance

Separation (mm)	Extra Low Voltage	Low Voltage	Other Services (Above Ground)	Other Services (Below Ground)
Extra Low Voltage	-	As specified	150	500
Low Voltage	As specified	2 x cables above ground 100mm below ground	150	500
High Voltage Cables	500	300	300	500
Other Services (Above Ground)	150	150	-	-
Other Services (Below Ground)	500	500	-	-
Note:				
1. The above figures need not to apply to the short lengths of cables near the equipment to which the cables are connected.				
2. Clearances to power lines are excluded from above table as they are covered by the Electrical Machinery Regulations. Furthermore, clearances to traction lines are subject to the regulations of the relevant railway authorities.				

- The figures specified in the table above do not apply to cables that are installed in separate metal enclosures and/or cables on cable support systems (cable trays/ladders) that are separated with conductive partitions, provided such partitions are electrically bonded to earth.
- Notwithstanding above, cables of different classifications and/or purpose (e.g. data, audio or power), shall not be installed in the same duct or wireway, and the minimum separation

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



distance shall be kept even when their ducts or wireways are bonded (since radio frequency interference may then still be exhibited).

When cables have to cross, the crossing shall be at right angles.

c) Cable trenches in ground

— General

- The proposed trench route shall be surveyed for the presence of underground cables and/or services before digging commences.
- The site shall be preserved as far as possible. Only the minimum of trees, shrubs, rocks, etc. shall be removed and cleared for the cable route.
- Where surplus material has to be disposed of, the Contractor shall remove it from site and dispose of it in a location of his choosing in accordance with statutory environmental regulations.

— Excavation

- The cable trench shall be excavated along the routes indicated on the relevant drawings.
- Should the Contractor, during the excavation operations, come across obstacles (or other interferences, e.g. soil drenched with hydrocarbon-based solvents such as spilt oil, which could adversely affect cable insulation), the Contractor shall report the matter to the Engineer, who shall then advise an appropriate course of action.
- Trenches shall be dug to within the dimensional tolerances given by SANS 1200, parts DB and LC.
- Where the Contractor cannot excavate by means of machines, due to limited access and the proximity of other services, excavations shall be by hand.
- The bottom of the trench shall be level and shall follow the contours of the final ground level. Where the excavation is in excess of the required depth, the excavation shall be backfilled and compacted with suitable material to the required depth.
- The Contractor shall trim the trenches and clean up the bottom of the trenches after he has completed the required excavation.
- The Contractor shall remove all sharp projections, which could damage the cable where the trench is excavated through rocky formations, and shall remove all loose rocks, material, etc. from the bottom of the trench.
- No excavated material shall be left closer than 300 mm from the side of the excavation.
- Once the excavations for cable trenches have been completed, the Contractor shall give the Engineer one working day notice to inspect the trench and to be present when the measurements are made.
- The Contractor shall maintain the excavation in a good condition, free of water, mud, loose ground, rocks, stones, gravel and other strange material until the cables are installed.

— Installation of cables directly in ground.

- Dimensions of trenches for the installation of cables directly in ground

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Trenches shall be excavated as follows:

Table 4: Excavation of trenches

	Width	Depth
Telecommunication Cable	450 mm	650 mm
LV Cable	450 mm	650 mm

- However, the following minimum clearances shall be maintained:

Table 5: Minimum clearances

	Vertical	Horizontal
Data and Telecom Cables	300 mm	300 mm
Water pipes	300 mm	300 mm
Sewer pipes	300 mm	800 mm
Storm water pipes	300 mm	600 mm
LV cables on same route	100 mm	One cable diameter of larger cable

- Where a cable will cross over other services, the cable shall not be installed at a depth less than 600 mm below ground level, and if this is not possible the cable shall be installed underneath the other service and shall be protected in the prescribed manner by means of concrete slabs. The depth of the cable shall be maintained for one metre on either side of the crossing.
 - If it is not possible to cross over or underneath a service in the prescribed manner, the matter shall be referred to the Engineer for a decision.
 - Where more than one cable needs to be installed in a trench, the width of the trench shall be increased with a distance equal to the clearance required.
- Sand bed and sand bed cover for cables
- A sand bed layer of soft soil shall be installed and levelled at the bottom of each trench after the trench has been approved by the Engineer, and prior to cable laying.
 - If the excavated material is not suitable for the sand bed layer, then suitable soil shall be imported for this purpose. Quarried sand, man-made sand, sand clay and loam are usually suitable; sea sand, river sand, clay, chalk, unmixed ouklop, peat and mine sand may not be used. The cost of importing shall be included in the price for the excavation.
 - The minimum thickness of the sand bed layer shall be 50 mm.
 - If the soil for the sand bed and sand cover has to be sifted, a sieve with holes not larger than 6 mm shall be used.
 - The cable shall, after the completion of the trench, be laid as soon as possible so that the trench can be backfilled.
 - The sand bed cover for LV cables shall be 150 mm thick, of similar soil and shall be placed directly after the cable(s) has been inspected by the Engineer.
 - Only one cable shall be laid at a time and the Contractor shall take precautions that the cables which are already installed are not damaged.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



— Laying of cables

- Cable rollers shall be used when cables are drawn into trenches. The cable rollers shall be placed so that the cable does not touch the bottom or the sides of the trench.
- If the Contractor intends using a winch to draw the cable into the trench, a cable stocking shall be used or the draw wires shall be soldered to the cable, such that the tension is exerted on all the cores, lead sheath and/or steel wire armouring at the same time.
- The maximum tension on a cable during laying operations shall not exceed the value specified by the manufacturer.
- Sufficient lengths of cable shall be left at the beginning and end of the cable routes to allow for the termination of the cables. The Contractor shall take the necessary precautions to protect the cable ends until they are terminated. The cable ends shall be sealed by means of lead or heat-shrink sealing caps to ensure that the cable is waterproof.
- Where cables are drawn through sleeves, care shall be taken that they are not kinked or excessively bent.
- The Contractor shall keep accurate records of each length of cable laid. The following information shall be recorded:
 - i) Cable drum number
 - ii) Size of cable
 - iii) Position of where the cable has been installed, i.e. the starting and finishing points
 - iv) Length of cable
 - v) Date of installation
- The Contractor shall be liable for the repair of cables due to the faulty manufacture, should this information not be recorded directly after the cable has been laid.
- The Engineer shall inspect all cable trenches before backfilling to ensure that the laying of cables complies with the specification.

— Backfilling of trenches

- When the cable has been laid, inspected and approved and the sand bed cover has been installed, the trench shall be backfilled with soil containing not more than 40% rock or shale which shall be able to pass through a 100 mm sieve and which is approved by the Engineer.
- Where more than 40%, but less than 70%, rock occurs, the Contractor shall replace the rock with imported soil. However, should more than 70% rock occur then all the backfilling material shall be imported.
- The Contractor may import further stone-free material to the site or sieve the excavated material for sand bedding and cover, but payment shall only be compensated for the actual quantity of imported material required as determined by the Engineer. The quantity of imported material required shall be calculated from the nominal trench width.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- The excavated material shall be backfilled in layers of 150 mm and shall be well compacted and consolidated to 90% MOD AASHTO. Where the Engineer deems necessary, the Contractor shall use a mechanical vibrator to compact the trench.
- The Contractor shall maintain the completed sections of the cable trench in a proper safe condition for the duration of the contract. The Contractor shall refill and compact the trench where subsidence occurs.
- After completion of the work the route of the cable shall be neatly finished off and cleared. All stones bigger than 25 mm, as well as all loose organic material and rubble, shall be removed.
- Electrical warning tape, consisting of two tapes laid side-by-side and overlapping (such that their combined width is 150% of a single tape width), shall be installed on all cable routes (LV and MV), 200 mm above the top cable layer. Where a cable route exceeds 600 mm in width, multiple warning tapes shall be run, in such a way that the space between adjacent warning tapes does not exceed 150 mm.

— Installation of concrete slabs

Where cables cross other services such as water pipes, sewage pipes and other cables, or where the chance exists that the cable may be damaged as a result of excavation by others, the cable shall be protected by means of reinforced concrete slabs. The slabs shall protect the cable for a distance of 500 mm on either side of the crossing.

c) Cable Sleeves

— General

- The construction of sleeves draw pits and associated earthworks shall be in accordance with SANS 2001-DP3.
- Sleeves shall be PVC unless otherwise specified.
- The sleeves shall have a minimum wall thickness of 5 mm and mass not exceeding 45 kg per sleeve length.
- Where a change of direction is required, draw pits shall be constructed. Bends may only be used where prior approval has been granted by the Engineer. Where such approval has been granted, the maximum angle of a single bend in a sleeve shall be:
 - i) 45°, when all cables have a diameter less than 35 mm; or
 - ii) 22.5°, where any cable has a diameter greater than 35 mm.
- All bends shall be of the long radius type.

— Method of Laying

- In order to facilitate future location of the sleeves, they are to be installed strictly in accordance with the relevant drawings.
- The Contractor shall select the number and/or dimensions of sleeves such that an additional cable, of outside diameter equal to 20% of the sum of the outside diameters of the installed cables, can be pulled into the sleeve at a future date. Under roadways, this spare capacity shall be 50%. Notwithstanding above requirement, a minimum of two sleeves shall be installed under all roadway crossings.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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- When installed beneath roads, there shall be a minimum of 750 mm of cover above the crown of the sleeve, and the sleeve shall be extended to 1,5 m on either side of the road surface or kerb face.
 - Where sleeves are installed during road construction, the sleeve positions shall be marked with the letters "E" or "ESC" for electrical, and "TEL" for telecommunication sleeves, cut or cast into the concrete of the kerb (or concrete marker, should the road be without kerbs). The grooved letters shall also be painted red, to facilitate easy identification.
 - The sleeves shall be laid straight to within the dimensional tolerances given by SANS 1200-part LC.
 - After installation, all foreign matter in the pipe shall be cleared.
 - The sleeves shall be sealed with PVC plugs to prevent the entry of sand before backfilling.
 - Precautions shall be taken to prevent damage to the sleeves during future construction activities.
 - All sleeves shall be left with an 8 mm diameter nylon draw wire, or draw wire to SANS 2001-DP3, in place, anchored at each end.
- Bore and Sleeve Jointing
- The bore shall be accurate, smooth and without surface cracks, and the inside edges edged or rounded.
 - The edging or rounding shall be such that no ridge is formed when two sleeves are joined.
 - A suitable slip collar, or other simple device, shall be provided to maintain the 5 mm spacing after the installation of the sleeves.
 - Joints shall be carried out with suitable couplings to prevent movement between pipe ends.
 - Joints shall be flexible enough to allow angular adjustments of up to 5° between adjacent lengths of sleeves during installation and afterwards to allow for subsequent subsidence of the ground.
 - The joints need not be watertight but shall stop sand and other materials entering the sleeves.
- Draw pits and masonry
- Where they are to be constructed in residential or commercial zoned areas, and where part of the draw pit will be visible above ground, the masonry units to draw pits shall be FBS (face brick standard). All other draw pit builds shall utilize solid concrete units.
 - Draw pits covers shall be of cast iron manufacture, or as specified in the particular specification.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



C3.3.4.2.3.6 E100.3.6 MARKING AND LABELLING OF CABLES

a) Low Voltage Cables

- Conductors and/or cables shall be identified at both ends by cable markers, consisting of plastic sleeves with pre-printed, legible and indelible alpha/numeric element inserts. The plastic sleeves shall fully encircle the conductor and/or cable. The markers shall be suitable for the intended environment, for instance, UV resistant where installed in sunlight, etc. Reference character sizes shall not be less than 3 mm high.
- The colours of conductor PVC insulation shall comply with SANS 10142-1, par. 6.3.3. The colours of conductors for sub-circuits shall as far as possible correspond with the colour of the supply phase. Except in the case of multi-way switching, the colour of a conductor may not change at any point along its run, starting from its point of origin at a circuit breaker inside the switchgear assembly. In other words, where loop wiring is employed, the colour of conductor insulation shall be the same throughout the circuit.

C3.3.4.2.3.7 E100.3.7 DRAWINGS AND DOCUMENTATION

a) General

- All drawings, information, and documentation shall be in English, and each item shall be identified with:
 - The Client's name and contact details
 - Client's project / scheme / contract reference title and numbers
 - The Engineer's name and contact details
 - Engineers reference numbers
 - Contractor's work / contract / order references
- Drawings for acceptance shall be provided on A4 or A3 paper copies as specified.

b) Drawings for Approval

- The following documentation and drawings shall be submitted to the Engineer prior to the installation of cables and wireways and before civil construction have started on the areas where cable routes are required:
 - Cable route layout drawings showing
 - Type of wireways
 - Trenching
 - Cable junction boxes

c) As-built Drawings

- The Contractor shall produce detailed "as-built" drawings, clearly labelled as such, and consisting of 3 sets of drawings printed to their original size. Where the original drawings were larger than A3, 3 sets of printed drawings scaled to A3 size will be supplied. The A3 drawings will not have any information omitted from the printed area. The drawings will indicate the positions of the following:
 - Wireways (e.g. trenches, conduit, cables ladder/trays, power skirting etc.)

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Cable routes (including any cable joints)
- General arrangement drawings
- Single line diagrams

d) Operating and Maintenance Manual

- Three Operation Manuals, three Maintenance Manuals and three Certification copies shall be provided for all equipment supplied. The manuals shall be in A4 format.
- The operating and maintenance manuals shall include at least the following:
 - A schedule of installed components and equipment, containing the following information:
 - i) Manufacturers name and contact details
 - ii) Circuit number (DB name, circuit breaker e.g. DB01-CB08); and
 - iii) Function (e.g. switching lighting circuit DB03-L1)
 - A schedule of all installed cables, with the following information:
 - i) Circuit number (DB name, circuit breaker e.g. DB01-CB08)
 - ii) Size
 - iii) Installed length; and
 - iv) Function (e.g. "Feeding Submersible pump IW-SP-01")
 - Description and details of:
 - i) Detailed description of the function of all operator controls
 - ii) Procedures for fault finding
 - iii) Maintenance instructions for all components and including repair, overhaul, change-out and installation procedures
 - iv) Inspection schedules; and
 - v) Spare parts information and recommended spares

C3.3.4.2.3.8 E100.3.8 TESTING AND COMMISSIONING

a) General

- The installation shall be inspected and tested in accordance with SANS 10142-1.
- Inspection and testing shall only be performed by personnel with approved, current qualifications. The Contractor shall provide qualified personnel for the supervision for all inspection and testing activities.
- The Contractor shall provide all necessary safety equipment and test instruments. All test instruments shall comply with SANS 61010 and have an up-to-date test and calibration certificate.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- The Contractor's safe working arrangements shall comply with the safety management systems and procedures prevailing on site. Where there may be a risk of injury to personnel, the Contractor shall submit a risk assessment and method statement for approval, prior to starting work.
- Unless otherwise specified in the Particular Specification, all inspection and test results shall be recorded using pro forma documentation (test certificates and schedules) complying with SANS 10142-1.
- The Contractor shall make provision for all inspection and testing activities to be witnessed. Unless otherwise specified in the Particular Specification, the period of notice for witness testing shall be 5 working days.
- Where most of the inspection and testing activities are not witnessed, the Contractor shall allow for 10% of the inspection and testing activities to be repeated for witness testing.
- If there is a requirement for additional inspection and test activities to be performed as part of the commissioning process, this shall be specified in the Particular Specification.
- Unless otherwise agreed by the Employer, no part of the installation shall be commissioned until all defects or omissions revealed by inspection and testing have been rectified. Where a defect or omission renders all or part of the installation unsafe for use, the Contractor shall take approved precautions to ensure that no part of the installation can be commissioned.

b) Test Sequence

- Inspections before testing:
- Before testing, inspections shall be performed to verify:
 - All equipment and material are of the correct type and complies with applicable SANS and IEC standards
 - All parts of the installation are correctly selected and erected
 - No part of the installation is visibly damaged or otherwise defective
 - The installation is suitable for the environmental conditions; and
 - The installation complies with this Specification
- Testing of Installation
 - On satisfactory completion of the commissioning and inspections the contractor shall test the entire installation, as per SANS 10142-1 requirements.
 - The contractor shall issue a Certificate of Compliance to the engineer, upon successful completion of the installation test.

C3.3.4.2.4 E100.4 LOW VOLTAGE SWITCHGEAR AND CONTROL GEAR ASSEMBLIES

C3.3.4.2.4.1 E100.4.1 SCOPE

a) Application

- This Standard Specification defines the requirements for the design, construction, installation, inspection, testing and commissioning of LV switchgear and control gear assemblies (Assemblies), including distribution boards (DBs), motor control centres (MCCs), single standalone motor starters or controllers, control panels (either standalone or forming

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



an integral part of the Assembly), control desks and consoles. Where this type of electrical equipment is incorporated within a plant supply package, the provisions of this Specification shall also apply.

b) General Requirements

- An Assembly shall incorporate all components and equipment necessary to achieve the
- All materials, components, and equipment used in the manufacture of the Assembly shall be new and unused, shall be of current manufacture, and shall be free from any defects or imperfections.

C3.3.4.2.4.2 E100.4.2 STANDARDS

a) Associated Documentation

- This Specification contains standard amendments and requirements which shall be applied to the referenced statutory and national standards. The project-specific requirements are provided in the Detail Specification, which shall be read in conjunction with this Specification.
- The design, construction, installation, inspection, testing and commissioning of the Assembly shall comply with all relevant statutory regulations, and the latest editions (current at the time of Tender) of all relevant South African National Standards.
- The manufacturer shall operate an approved, auditable quality assurance system covering the design, construction, inspection and testing of the Assembly.

b) Statutory Requirements

- The Assembly as manufactured, and as installed on site, shall comply with the following:
 - Occupational Health and Safety Act of 1993
 - Manufacturer's specifications and installation instructions

c) Reference Standards

- The Assembly and all its constituent components and equipment shall comply with the latest published edition of all relevant national standards, including the following:

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

**Table 6: Section 4: Reference standards**

Standard Number	Description
SANS 152	Low-voltage air-break switches, air-break disconnectors, air-break switch-disconnectors, and fuse-combination units
SANS 156	Moulded case circuit-breakers
SANS 172	Low Voltage Fuses
SANS 1091	National colour standards for paint
SANS 1973	Low-voltage switchgear and control gear assemblies
SANS 9000	Quality management systems
SANS 10108	The classification of hazardous locations and the selection of apparatus for use in such locations
SANS 10142	Standard Regulations for Wiring of Premises.
SANS 60044	Instrument Transformers
SANS 60204	Safety of machinery. Electrical equipment of machines.
SANS 60269	Low-voltage fuses.
SANS 60439	Low-voltage switchgear and control gear assemblies
SANS 60529	Degrees of protection provided by enclosures (IP Code)
SANS 61558	Isolating transformers and safety isolating transformers.
SANS 60947	Low-voltage switchgear and control gear
SANS 61000	Electromagnetic compatibility (EMC)
SANS 61643-1	Low-voltage surge protective devices Part 1: Surge protective devices connected to low-voltage power distribution systems

C3.3.4.2.4.3 E100.4.3 CONSTRUCTION REQUIREMENTS**a) General**

- Assemblies shall be designed and constructed to facilitate inspection, cleaning, repair and maintenance and to ensure absolute safety during operation, inspection and maintenance.
- The arrangement of all circuit components / functional units shall be to the approval of the Engineer.
- Where detailed in the Detail Specification, spare compartments of a given size shall be provided within the enclosure. Each shall be equipped with a plain (i.e. un-punched) opening compartment door.
- Every spare compartment shall be sized to house a triple pole and neutral incoming short circuit protective and isolating device and shall be provided with a compartment earthing terminal.
- Every spare compartment shall be provided with a gland plate or have access to an existing cable way within the enclosure.

b) Enclosures

- All conductors and terminals that form part of the Assembly, including earth conductors and the Assembly earth bar, shall be enclosed within it. An earth stud may be provided as a part of a cable glanding facility.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Assemblies shall be constructed of materials capable of withstanding the mechanical, electrical and thermal stresses to which it may be subjected and the environmental and operating conditions likely to be encountered in normal service.
- All boards, panels and cubicles shall be vermin and dust proof and the minimum degree of protection shall be:

Table 7: Minimum levels of ingress protection

Location	Description	Minimum rating
Indoor	Clean, dry areas (e.g. inside substations or motor control rooms)	IP44 (doors closed) IP2X (inter-compartment & doors open)
Outdoor	Located outside buildings	IP65 (doors closed) IP2X (inter-compartment & doors open)

- Where heat is generated within the enclosure, it shall, where possible, be designed to dissipate naturally from the enclosure surface. Where this is not possible, ventilation openings shall be provided that maintain the highest practicable IP rating of the enclosure, subject to a minimum of IP42. Where cooling air is drawn into the enclosure, dust filters shall be provided where practicable.
- For all variable speed drives and soft-starters (without bypass contactors) installed in indoor Assemblies, mini-extraction fans shall be installed inside the drive compartment to dissipate heat, without compromising the assembly's IP rating.
- Particular attention shall be given to the ventilation of outdoor mounted boards, to eliminate build-up of excessive heat inside the boards caused by the solar radiation or internal heat generation.
- Any internal partitions necessary to provide inter-compartmental segregation within the enclosure shall be of the same material as the sides of the enclosure.
- All the surfaces of the enclosure, and of its constituent equipment and components shall be suitably protected against the effects of any likely atmospheric corrosion present at the operating location.
- Purpose-made gland plates shall be protected against corrosion by electro-plating, galvanising, or be made of stainless steel and shall not be painted.

c) Construction of Free-Standing MCCs and DBs

- Free-standing MCCs and DBs shall be constructed from steel with a structural frame permanently clad with side plates, so as to provide a multi-compartmented structure that is rigid with all doors and covers removed, and such that it will not deform during transport or installation. The enclosure doors and covers shall themselves be suitably braced so as to be rigid and not deform or flex when fully equipped and handled.
- Each compartment formed within the enclosure for the purpose of housing components or equipment shall be provided with dedicated mounting plates for that purpose, which when removed do not expose any other compartment or live parts. Cabling shall only be terminated on or in the enclosure at gland plates provided for that purpose.
- Horizontal wireways (top and bottom) shall extend through the width of each section.
- The minimum metal thickness of the enclosure's constituent parts shall be as follows:
 - External cladding: 2 mm

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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- Internal partitions: 1.6 mm
- Doors and removable panel covers: 2 mm
- Free-standing Assemblies shall be mounted on and bolted to a rigid hot-dip galvanised steel 100 x 50 x 6 mm channel base.
- The maximum height of any Assembly (including its base) shall be 2 100 mm above finished floor level. No equipment other than busbars and/or inter panel control wiring shall be installed higher than 1900 mm above finished floor height, neither shall any equipment, other than cable glands and inter panel control wiring be installed lower than 300 mm above finished floor level.
- Compartment single doors shall have vertical hinges mounted on their left-hand side, and all doors shall have an angle of opening that is limited to 95 degrees. Where specifically agreed with the Engineer, a compartment single door on a front access only Assembly may be hinged on the right-hand side if this will reduce the number of dropper / cable way chambers required. Wide compartments with dual doors shall open in wardrobe style, such that the second door is interlocked with the first.
- Any cover which is required to be removed for adjustment, access, or maintenance and exceeds 0.75m² in area, shall be provided with supporting lips, lift-off hinges, locating dowels, or handles, in order to facilitate safe removal and replacement.
- Doors and any covers shall be fixed to the enclosure using captive bolt type fasteners, and each hinged door shall be capable of being removed, following disconnection of the electrical and earthing connections. Compartment doors shall be provided with securing catches which can be locked with a padlock, as follows:
 - door ≤ 400 mm high 1 No.
 - door >400 mm high 2 No.
 - door >1200 mm high 3 No.
- The Assembly shall be constructed for front and rear access unless otherwise specified in the Detail Specification. Where the Assembly shall be designed for front access only it shall be possible to gain access to every component, item of equipment, busbar and cable from the front (or for busbars, the top) of the enclosure; whether for maintenance or for replacement.
- The form of internal separation (in accordance with SANS 60439-1) shall be as specified in the Detail Specification. Form 3b or 4a as appropriate, shall be considered the minimum allowable internal separation for MDBs and MCCs.
- Any apertures between compartments (including busbar compartments) through which the copper-work or cabling passes, shall be effectively closed off to minimise the possibility of an arc fault propagating between compartments.
- Fixings for components, component mounting plates, etc. shall not penetrate another compartment containing live parts. Where self-tapping screws are used for component fixing, they shall be of the thread forming or thread rolling type. Components, wiring, labelling, etc., shall only be located within compartments on a removable mounting plate, and in such a manner that facilitates easy inspection, maintenance, or removal and replacement, and without necessitating the removal or dismantling of any other components or wiring, or the use of special tools.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Unless detailed otherwise specified in the Detail Specification, the Assembly shall be constructed so as to facilitate future extension by the addition of extra full height sections at either end. To accommodate this, any covers, fixings, etc. shall be flush with the end faces of the enclosure, and the end sections of busbars and earth bars shall be prepared for future extension.
- The Assembly shall be constructed so as to permit it being split into sections in order to facilitate transportation and subsequent site erection. Each transportable section shall be labelled as to its shipping weight, shall be equipped with lifting eyes, which shall be removed on completion of the site erection.
- All Assemblies shall have at least 15% spare unequipped space complete with busbars, partitioning into compartments, etc. for future extensions.

d) Power distribution within an Assembly

- The power distribution and circuit protective arrangements within an Assembly shall be designed so as to co-ordinate with the characteristics of the electrical system(s) connected to the incoming terminals of the Assembly, including emergency or temporary supplies and specifically noting the following:
 - maximum prospective RMS short circuit current from all simultaneously available sources of supply, together with any fault contribution from large motors directly connected to the Assembly
 - type of system earthing (i.e. TN-S, TT, etc.), the maximum available earth fault current, and the maximum earth fault loop impedance
 - up-stream protective device ratings and settings
- Where this information is not stated in the Detail Specification, it shall be obtained from the Engineer before the design of the Assembly commences.
- Where the maximum prospective RMS short circuit current from all simultaneously available sources of supply, together with any fault contribution from large directly- connected motors, exceeds 10kA, the Assembly a Type Tested Assembly with stated deviations in compliance with SANS 1973-1.
- Where the maximum prospective RMS short circuit current is 10kA or less, the Assembly shall comply with the requirements of SANS 1973-3.

e) Functional unit short-circuit protection and isolation

- The Assembly shall be provided with separate incoming isolation for every electrical power system (including emergency or temporary supplies) connected to it.
- The connection from the Assembly power distribution system into every compartment shall be terminated on a short circuit protection device, which may also incorporate a compartment isolating device, for short-circuit protection of all the components within a functional unit.
- Every motor starter compartment shall be provided with a door interlocked isolation device, which shall isolate all sources of supply that enter the motor starter compartment. Where a functional unit; e.g. a motor starter, etc., comprises a group of interlocked compartments, the isolation device shall be located in the compartment receiving the supply.
- Every compartment containing a distribution board or low voltage transformer shall be provided with an isolation device, which may be located in an adjacent compartment. For some compartments housing power monitoring equipment or instrumentation and process

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



control equipment, it may be appropriate to provide a means of isolation within the compartment.

- Unless separate fuses are used as the short circuit protection device, the isolation device and short circuit protection device shall be combined. Fuses may only be used to limit fault currents if approved by the Engineer.
- Separate isolating devices shall be switch-disconnectors suitable for on-load switching. They shall be capable of being padlocked in the isolated / 'off' position at the compartment door, and at the isolating mechanism with the compartment door open. Any isolator mechanism extension shafts shall be provided with guide brackets as necessary to prevent excessive shaft deflection.
- The compartment door shall be mechanically interlocked such that it shall not be possible to open the door when the isolating device is in the 'on' / 'closed' position or when the operating handle is padlocked in the 'off' / 'open' position. Where the means of isolation is only accessible from within the compartment, it shall be protected to a level of IP2X.
- The following types of devices may be used:
 - Air circuit breaker (ACB) or moulded case circuit breaker (MCCB)
 - Fuse switch-disconnector
 - Switch-disconnector with separate fuses
- All field circuits connected to a functional unit (e.g. valve actuators, limit switches, etc.) shall be provided with isolation either by or within that functional unit.
- Where safety interlock keys are provided, e.g. to control device operation or to restrict access, they shall only be released in the safe condition, and shall be unique across that Assembly and any other Assembly installed at the same site.

C3.3.4.2.4.4 E100.4.4 ELECTRICAL COMPONENTS

a) Circuit Breakers (CBs)

- Circuit breakers shall be either air circuit breakers (ACBs) or moulded case circuit breakers (MCCBs), as indicated on the single-line diagram for the Assembly.
- CBs shall have a rated service short-circuit breaking capacity not less than that of the maximum prospective fault current at the point of connection in the power system, which shall be taken to be the busbar rated short-time withstand current specified for the Assembly. Incomer CBs shall have a rated short-time withstand current and time not less than that of the busbars.
- CBs with rated currents over 100 A shall have built-in protection, that will discriminate with both up-stream and down-stream protective devices, as appropriate to the application.
- ACBs for incomer and feeder applications shall be fitted with adjustable electronic protection. MCCBs for incomer applications shall be fitted with adjustable thermal-magnetic or adjustable electronic protection.
- An ACB shall incorporate pad-lockable cover(s) to permit the securing of the open, close, and trip actuators against inadvertent or unauthorised manual operation.
- Where an ACB or MCCB has electrically operated control circuits; e.g. opening, closing, tripping, spring charging, indication, etc., they shall be provided with individual fuse or MCB protection.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- All ACBs and selected MCCBs (as indicated on the single-line diagrams) shall be of a withdrawable pattern with the number of poles indicated on the single-line diagram.
- A withdrawable ACB or MCCB shall be provided with clearly visible carriage position indication (connected/disconnected/test) and shall be capable of being locked in each position. Mechanical interlocks shall be provided that only permit movement of the carriage whilst the main circuit contacts are in the 'OFF' position. It shall be possible to test the control circuits of an ACB with it partially or fully withdrawn.
- As a withdrawable ACB or MCCB is being withdrawn, pad-lockable safety shutters shall automatically cover over the supply side and the load side fixed connections. These shutters shall be capable of independently being opened for testing purposes.
- One (only) handling truck shall be provided suitable for each type of withdrawable ACB or MCCB supplied as a part of the Assembly, or as a part of any other Assembly supplied to the same building housing the Assembly.
- Special maintenance tools, where required, shall be provided with each breaker.
- Cables connected directly to CB terminals will generally not be permitted. Adequately sized cable/busbar adapters shall be provided.

b) Switch-disconnectors

- The switch shall be suitable for the continuous rated duty of the circuit it controls.
- The utilisation category of the switch-disconnector shall be AC23 for motor switching duties, and AC22 for switching of mixed resistive and inductive loads, with an appropriate utilization category (A for frequent switching and B for infrequent switching).
- Rotary switch-disconnectors shall be provided with a 'break-before-make' operation for each pole. The rotary switch, or changeover switch formed by the proprietary interlocked interconnection of two switch-disconnectors or fuse switches, shall incorporate a centre 'off' position.
- Switch-disconnectors for motor starter or variable speed drive duties, that incorporate a test position, shall enable the control circuit supplies while ensuring isolation of the main supply.

c) Fuse switches

- Fuses and fuse bases shall comply with the requirements of SANS 172 and shall be provided with an indicating device to show the "blown" state of the fuse.
- Only Motor circuit fuse links as defined in BS 88 shall be permitted on motor starting circuits.
- Fuse current ratings shall be indicated on engraved 20 x 12 mm white-black-white traffolyte labels in 4 mm figures. The labels are to be fitted at the fuse bases and shall not be obscured by wiring.
- This shall comprise a moulded carriage accommodating either HRC fuses or solid links and shall provide for a switched neutral where required.
- Provision shall be made for the following:
 - Double break contacts on each pole.
 - Arc barriers on each pole.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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- IP2X protection in either state.
 - Silver plated copper contacts.
 - Neutral link where required.
 - Mechanically operated ON/OFF indicator.
 - Auxiliary switch facility.
 - Full interchangeability of equivalent rated units
- The continuous thermal rating and the circuit fuse rating shall be indicated adjacent to the switch.
 - The minimum utilisation category of the fuse switch shall be AC23 for motor starting duties, and AC22 for power distribution only duties.
 - All fuses used on LV circuits shall be HRC cartridge type fuse links complying with both SANS 60269 and BS 88 Part 6 / BS 88 Part 2 Section 2.2 (fuse links with bolted connections), except as follows:
 - semi-conductor protection fuses recommended or provided by the manufacturer of any power electronics incorporated into the Assembly;
 - sub-distribution fuses for extra-low voltage control circuits in ICA equipment compartments.
 - The sub-distribution fuses for control circuits (mentioned above) shall be miniature ceramic cartridge fuses complying with BS 2950. They shall be mounted in knife-edge ('swinging blade') disconnect type DIN rail mounted terminals. Knife-edge disconnect type terminals shall similarly be used for neutral links.
 - Neutral and earth link holders shall be non-interchangeable with fuse holders, and fuse and link holders shall be segregated according to circuit voltage.
 - Where HRC cartridge type fuse links do not form an integral part of an item of equipment such as an enclosed transformer, a fuse switch, etc., they shall be mounted in all-insulated fuse carriers fitted into fuse holders. An associated neutral circuit shall be provided with a solid copper link, which shall be mounted in an identical manner adjacent to the phase circuit fuse holders.
 - Fuse and link bases shall contain insulating shrouds, that can only be removed using a tool. A fuse or link shall only be capable of insertion into its base using the appropriate carrier. Fuse and link carriers and holders shall be coloured as follows:
 - fuse links: black
 - neutral links: white
 - earth links: green
 - A spare set of all fuse types and ratings used within a functional unit shall be mounted within each functional unit.
 - Combination fuse switches shall comply with SANS 152 and shall be of the independent manual operation type and shall afford minimum protection of IP21.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



d) Switch operator

- Switch operating mechanisms shall include operators for fuse switches, switch-disconnectors, moulded case circuit breakers and motor protection circuit breakers for Assemblies.
- Switch operating mechanisms shall be door mounted and the switches shall be fixed mounting.
- Switch operating mechanisms shall positively engage with the switch shaft when the door is fully closed and shall be so interlocked with the door so that:
 - It shall not be possible to gain access via a cover or door to any live points unless the switch is in the open position.
 - It shall not be possible to re-close the door or cover unless the switch is in the open position. Operation of the switch with the door open is permissible.
- Clear indication shall be given, both with the access cover or door open or closed, as to whether the switch is in the open or closed position. Colour indication alone will not be acceptable.
- Operating handles shall be pad lockable in the “off” / “open” position. The mechanisms shall accept not less than two padlocks each having a shackle diameter of 6 mm.
- Any isolator mechanism extension shafts shall be provided with guide brackets as necessary to prevent excessive shaft deflection.

e) Contactors, Relays and Timers

- Contactors and relays shall be selected so as to be suitable for the foreseeable operating duty (utilisation category) and operational frequency. They shall operate reliably under reduced voltage conditions by closing (i.e. pulling in and holding) at 85%, and remaining closed at 60%, of the rated coil voltage, and shall be suitable for continuous operation at 110% of the rated coil voltage.
- Contactors shall comply with SANS 60947-4-1 and shall be electro-magnetically operated air-break multi-pole block type construction. They shall readily accept a wide variety and configuration of auxiliary contact blocks, which shall have their terminals protected to IP2X.
- Relays and timers shall be totally enclosed plug-in devices. The bases shall be keyed in order to differentiate between differing relays and timers, and their differing coil / electronics operating voltages, and to prevent incorrect insertion. Bases shall be fitted with retaining clips, and each relay / timer shall have its pin configuration printed on the side of its casing.
- Relay / timer bases shall have screw clamp type terminals protected to IP2X, which shall be accessible with a screwdriver whilst the relay / timer is plugged in.
- Relays shall be provided with a transparent enclosure, visual indication that the relay is in the energised and closed state, and a manual test button.
- Timers shall operate electronically or be synchronously driven and shall be provided with linearly calibrated time interval scales. The smallest indicated time interval shall be 10% (or less) of full scale, with a repeatability of 1% (or better) of full scale. Timers shall be provided with ‘energised’ and ‘timed out’ indicators.
- Where timers require to be viewed by operators, they shall be flush front of panel mounted behind a transparent lockable cover.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Contactors shall be satisfactorily withstand the thermal and dynamic effects arising from the magnitude and duration of through fault currents dictated by the characteristics of the associated protective devices and shall be selected in accordance with the kW/current rating.
- Contactors shall be triple-pole electromechanically operated air-break type, held in or latched pattern as specified.
- Contactors shall be classified as utilisation category AC3 uninterrupted duty for motor starting and as utilisation category AC1 intermittent duty, Class 1, 60% for heater duty.
- Contactors shall be fitted with the required auxiliary contacts. These shall be rated at not less than 6 A and shall be positively driven in both directions.
- Auxiliary relays for control purposes shall be of the multiple pole type and shall preferably possess the feature of field convertible contact configuration.
- Plug-in type relays shall have:
 - Positive-acting mechanical retaining clips. Contact friction alone as a retaining method is unacceptable.
 - A keyed member on plug and socket sides to prevent incorrect insertion.
 - Clear and indelible markings on both the relay and its base indicating the circuit reference in conformity with the associated circuit and connection diagrams.
- Auxiliary time delay relays shall be of electronic or synchronous motor-driven type and the time setting shall be infinitely adjustable over the range of 5–100% of the maximum delay. Timing relays deriving the delay function by thermal or pneumatic means will not be acceptable.
- Auxiliary relays shall have a minimum of 4 individual contacts and shall preferably have the facility to add an extension block with an additional four (4) individual contacts.

f) Control switches and pushbuttons

- Control selector switches shall be of a rotary spring-loaded type, with an AC11 rating, and shall have clearly identified switch positions. Where switches are lockable, the key shall be held captive in the abnormal or over-ride position.
- Pushbuttons shall comply with SANS 60947-5-1 and shall be of a 22 mm diameter, flush bezel type.
- Emergency stop pushbuttons shall be of a mushroom headed push to stop, stay-put and twist-to-release type. Key type release buttons shall not be used.
- Pushbuttons shall be coloured as follows:

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

**Table 8: Pushbutton colours**

Function	Colour
Start	Green
Stop	Red
Reset	Black
Emergency stop	Red
Lamp test	Black
Close / Down	Green (or black)
Open / Up	Green (or white)
On	White (or green)
Off	Black (or white)
Forward	Green (or white)
Reverse	Green (or black)

- Pushbuttons shall be of the one-hole fixing, oil tight pattern.
- Operators (and the mating holes) shall be keyed to prevent rotation of the assembly in the panel.
- Contacts shall be adequately rated for the circuit duty but shall not be less than 10A, 230V AC or 120V DC rating.
- In addition, the operator shall carry an internationally acceptable symbol indicating its function or shall have mounted immediately above it a clear legend of its function or action.
- Operators initiating a motion or circuit closure shall be flush with the surrounding bezel, while operators stopping a function or opening a circuit shall project beyond the bezel.
- Operators providing a selective function e.g. local/remote or auto/manual, shall operate in a semi-rotational manner with equal angular displacement about an imaginary vertical centre line.

g) Indicating lamps

- Indicating lamps shall be suitable for use on either 230V AC or 24V DC control supplies and shall be light emitting diode (LED) type. Lamps suitable for use on 230V AC shall incorporate a step-down transformer. Indicating lamps shall be continuously rated for a voltage of 10% in excess of the rated voltage.
- Lamps shall comprise 22 mm diameter units incorporating either a multi-cluster array of LEDs or a single high intensity surge protected LED; replaceable from the front of panel without any special tools.
- Indicating lamps shall render good visibility under conditions of an ambient illumination level of 400 Lux.
- Lamps shall be provided with one of two indicator lamp colour coding schemes as follows:
 - a primary colour coding scheme, in compliance with IEC 60073, or
 - a secondary colour coding scheme; which although not standard, is required in order to harmonise with existing operational equipment.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Unless detailed otherwise in the Detail Specification, the Assembly shall be provided with indicating lamps coloured in accordance with the primary colour coding scheme, which shall be as follows:

Table 9: Primary colour coding scheme

Function	Colour
Dangerous condition	Red
Emergency / hazardous condition	Red
Emergency stop operated	Yellow
Impending critical condition	Yellow
Alarm / abnormal condition	Yellow
Tripped / fault condition	Yellow
Warning	Yellow
Normal condition	Green
On	Green
Running	Green
Closed condition	Green
Mid position / mid travel	Green + White
Open condition	White
Available / auto available	White
General indication / monitoring	White
Mandatory operation required by operator	Blue

- Where specified in the Detail Specification, the manufacturer shall supply an additional number of loose indicating lamps (or their coloured lenses) of a specified type and coloured in accordance with the primary colour coding scheme and shall retrofit these to specified existing assemblies.
- Where an assembly is provided that incorporates lamp colours in accordance with the secondary colour coding scheme, the manufacturer shall also supply an additional quantity of loose indicating lamps. There shall be a sufficient quantity of the required types and colours; coloured in accordance with the primary colour coding scheme, to permit a third party to retrofit them the Assembly at a later date in order to bring it into compliance with the primary colour coding scheme. In addition, the final drawings for the Assembly shall not detail the colour of any indicating lamp that does not comply with the primary colour coding scheme.

h) Power measuring instruments and current transformers

- The Detail Specification states which functional units shall be provided with power/current and voltage measuring instruments, the type, and the facilities required.
- Display instruments used to indicate voltages and currents shall normally be analogue instruments, shall comply with IEC 60051, be of the low-impedance type and have an accuracy class of 1.5. They shall be flush front of panel mounted with a 90° quadrant minimum scale length, and be DIN96 size for power distribution functional units, and DIN96 or 72 sized for motor starter functional units.
- External zero adjustment shall be possible on all indicating instruments to facilitate adjustment without dismantling the instrument.
- Instruments shall be scaled to 120% of the anticipated designed indication. Ammeters shall be provided with compressed scales to accommodate motor starting or other in-rush currents, and ammeters monitoring motor currents shall be provided with an adjustable red pointer to indicate full load current.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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- Meters and relays shall be capable of withstanding, without damage, the secondary currents associated with the maximum available through fault current.
- Instruments shall be provided with shrouded connections to their rear, and ammeter circuits with a full-scale deflection in excess of 25 A shall be connected via current transformers (CTs). Apart from CT and ammeter circuits, instrument circuits shall be fused.
- Instruments used in power distribution circuits shall be flush front of panel mounted and shall provide selectable front of panel digital display of at least the following measurements:
 - voltage between phases and between phases and neutral
 - current in each phase
 - power (kW)
 - kVA
 - power factor
 - consumption (kWh)
- They shall provide data output signals for presentation to PLC, SCADA, telemetry, etc.
- Where the Detail Specification indicates that instruments shall provide fieldbus communication with a control system, this shall be via an open protocol compatible with the proposed control system.
- Run hour meters shall be of a 5-digit minimum non-re-settable odometer type, with visual indication of operation, and a minimum resolution of one hour.
- Current transformers (CTs) shall be air insulated, shall comply with SANS 60044, and shall have short circuit ratings in excess of those prevailing at the point of connection. They shall bear individual rating plates, which shall clearly identify the winding polarities (primary or secondary), together with the connection details of any multi-ratio windings.
- Current transformer accuracy classes shall be selected as follows unless otherwise indicated on single-line diagrams:

Table 10: Transformer accuracy classes

Type of circuit	Class	Comments
Indication	3 or 5	To match the % accuracy of the instrument
Measurement	0.5 or 1	To match the % accuracy of the instrument
Motor protection	10P10	Or as required by protection device manufacturer
Power system protection (e.g. IDMTL)	10P20	Or as required by protection device manufacturer
Power system unit protection (high accuracy; e.g. REF, generation, unit protection)	PX	As specified by protection device manufacturer

- One pole of the secondary winding of each CT (or group of CTs) shall be connected to earth via a link. All connections to the CT secondary winding shall be made via a proprietary shorting terminal test block. Provision shall be made for attaching test links.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Current transformers shall be of the low-impedance type and shall, where ratio, class and output requirements permit, preferably be of the ring-type bar-primary design.
- Current transformers shall be rated to withstand the thermal and magnetic stress resulting from the maximum available through fault current.
- Bridging terminals for current transformers shall be provided at the outgoing terminals where external connections are required. In addition, terminal blocks shall be provided to permit secondary injection tests on protective relays.

i) Control-circuit and auxiliary supply transformers

- Voltage transformers shall be designed, constructed and tested in accordance with the requirements of SANS 60044.
- Voltage adjustment over the range 95–105% of nominal ratio shall be provided by off-circuit tapings.
- Transformers shall be provided with isolating switches on the HV side and with protection on both the HV and LV sides.
- Voltage transformer primary and secondary windings shall be protected by fuses.
- The protection on the HV side shall be rated sufficient to withstand inrush currents.
- Control transformers shall be rated as follows:
 - Sum of sealed-in burden of all contactors, relays, timers and lamps fed from that unit; plus
 - Pickup burden of largest Contactor fed from that unit; plus 10%.
- The regulation on closing the largest circuit with all the loads except that of the largest load, or if there is more than one, one of the largest loads, imposed on the transformer, shall not exceed 5%.
- One side of the transformer secondary winding, or the star point thereof, shall be connected to earth via a removable bolted link.
- Voltage transformer nameplates shall be fixed in a position so that details can easily be read when fitted in the cubicle.

j) Capacitors

- Capacitors shall be of the non-toxic, dry, self-healing, metallised film type, and comply with SANS 60831.
- Capacitors shall be fitted with a means of electrical discharge to reduce the residual voltage to less than 60 V within 5 seconds of being switched off.

C3.3.4.2.4.5 E100.4.5 MOTOR STARTER FUNCTIONAL UNITS

a) General requirements

- Motor starter functional units shall be provided as indicated on the single-line diagrams and as detailed in the Detail Specification, and all equipment, components, and wiring shall be included to achieve the required functionality. The following methods of motor starting shall

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



be considered, where the selection is the Contractor's responsibility, to provide the required functionality:

- direct-on-line (DOL)
 - star/delta (open/closed transition to suit application)
 - line reactor
 - auto-transformer (closed transition)
 - soft starters and variable speed drives using power electronics
- Where specified in the Detail Specification, integral direct-on-line starters complying with SANS 60947-6-2, shall be used for motor starters of less than 10 kW. The integral motor starter shall incorporate an isolation device, a short circuit protective device, a contactor and overload protection with Type 2 coordination.
 - Each motor starter shall be provided with an isolation and short circuit protection device.
 - Motor starter contactors, short circuit protective devices, and thermal overloads shall be selected so as to provide Type 2 Co-ordination in accordance with SANS 60439-4-1. The minimum starter contactor utilization category shall be AC3.
 - Motor circuit residual current protection shall only be provided where necessary to discriminate with upstream protection, where the power supply is derived from a TT source, or where specified in the Detail Specification.
 - Contactors used where simultaneous closure would be dangerous, e.g. in reversing, star-delta, or closed transition starters, shall be provided with both mechanical and electrical interlocks.
 - Where components with short time ratings are used, e.g. resistors, transformers, etc., they shall be provided with hardwired temperature monitoring circuits, arranged to trip the line contactor if their thermal limits are reached.
 - Withdrawable starters shall be provided with suitable interlocks to prevent chassis withdrawal or insertion when the starter isolation device is in the "on" position.

b) Functional requirements

- Every individual motor starter unit shall include all equipment, components and wiring necessary to safely and reliably operate the driven plant item. It shall be possible to manually operate plant item from the front panel of its functional unit, notwithstanding any failure or de-selection of any automatic control system, networking / communication facility, PLC, SCADA, or telemetry system. In order to achieve this, the appropriate push buttons / keypads and indicators shall be provided front of panel.
- If the power supply fails whilst a motor is running, the line contactor shall open. On restoration of the power supply, the motor starter shall immediately be made available to re-start the motor without manual attendance or intervention on receipt of a start command (be it initiated manually or automatically). However, where a hardwired automatic control facility is available, a power-on delay timer (adjustable between zero and 60 s) shall be provided in the hardwired circuit.
- Where a 'healthy' signal is required, it shall confirm that the functional unit isolation device is closed, the starter control supply is healthy, no fault condition exists, emergency stop(s) are released, the local isolator (where fitted) is closed. The 'healthy' signal shall be used to provide the 'drive available' input signal to any automatic control schemes or automatic duty selection routines.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Each functional unit shall provide any automatic control schemes (including auto duty selection routines) with the following status signals as a minimum, as well as all others as specified in the Detail Specification:
 - Manual/auto mode
 - Running
 - Tripped
 - E/Stop activated
- Each motor starter shall be provided with an emergency stop circuit, which together with its components shall comply with BS EN 418. A field 'twist to reset' emergency stop button shall be provided. On operation of the emergency stop circuit, the motor line contactor shall immediately open, and the emergency stop circuit shall lock out until it is reset. A front of panel 'emergency stop operated' indication lamp and a status signal for PLC monitoring shall be provided. A composite starter may have a common emergency stop circuit controlling all of its constituent drives.
- Where identified in the Detail Specification, specific process or driven plant interlocks shall be hardwired into the motor starter, and when operated, shall stop and inhibit the drive.
- Front of panel pushbuttons shall be provided for manual start (forward, and where applicable; reverse), and manual stop. A front of panel control selector switches shall be provided for 'Manual / Off / Auto' or 'Remote / Local' as specified in the Detail Specification.
- Front of panel indicator lamps shall be provided for 'running' and 'tripped', and an ammeter shall be provided for motor circuits; other front of panel indications e.g. specific fault indication lamps, hours run meter, number of starts counter, etc. shall be as specified in the Detail Specification.

c) Motor protection

- As a minimum, every motor starter circuit shall be provided with a thermal overload unit connected to monitor the current in each energized winding of the motor. Unless otherwise specified in the Detail Specification, motors of over 30 kW shall be provided with electronic overload protection, and motors of over 75 kW shall be provided with electronic motor protection relays. Intelligent multifunction electronic relays shall be provided if specified in the Detail Specification.
- Thermal overloads shall be scaled and adjustable such that the motor rated current is mid-range and shall provide a temperature compensated thermal element for each supply phase to the motor. The unit shall provide single phasing protection and incorporate auxiliary tripping contacts with a manual test facility. The unit shall be capable of being manually or automatically reset (set to auto). Unless otherwise specified in the Detail Specification, thermal overloads shall be trip class 10.
- Electronic overload units shall incorporate the features required of a thermal overload, together with provision for the adjustment of tripping and reset times. In addition, stalled rotor protection shall be provided, together with integral thermistor protection where required. Where required, electronic overloads shall be suitable for use in conjunction with power electronics (soft starters or variable frequency converters).
- Electronic underload protection shall be provided for all centrifugal pump, fan, or directly driven mixer motor circuits above 30 kW. When detecting underload, the device shall measure the true motor power (and not just the phase angle), shall be configured to detect an unloaded running motor condition, and shall incorporate start delay, motor trip, and

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



manual / auto reset (set to auto) facilities. The unit shall incorporate a digital percentage load display.

- Where required on drives of less than 30 kW, the underload unit shall be provided with overcurrent protection providing the same facilities as a thermal overload. When required on larger drives, underload protection shall be provided as an integral part of an electronic overload or motor protection relay, and where applicable shall be suitable for use in conjunction with power electronics.
- Motor thermistor and RTD (PT100) relays shall be provided for motors which have been specified to be fitted with thermistors or RTDs.
- Motor starter functional units for immersible/submersible pumps shall incorporate all the standard integral motor and pump protection, such as water ingress, temperature of windings and bearings, vibration, etc.
- All protection devices shall operate in a fail-safe manner via electrically maintained relays which de-energise on a fault condition. On sensing a trip condition, the devices and relays shall electrically lock-out the emergency stop circuit and shall be reset manually using a front of panel common fault reset pushbutton. In addition, they shall automatically reset on control supply switch on and upon power restoration in the event of a power loss.
- Electronic motor protection relays and digital overload and underload devices which provide operator interfaces shall have front of panel mounted displays and controls.

d) Test circuits

- The motor starter control circuit supply shall be provided with a functional test facility, whereby the functionality of the control circuit and its equipment and components can be fully demonstrated with the compartment door(s) open, but whilst the motor circuit supply remains isolated at the functional unit isolating device.
- A control selector switch shall be provided for 'Normal/Test' selection inside the relevant compartment
- The test supplies shall be arranged to be de-energised when the motor circuit supplies are energized. The test supply shall be provided with short circuit protection and shall be capable of isolation.

C3.3.4.2.4.6 E100.4.6 BUSBAR AND BUSBAR TRUNKING

- The main distribution circuit through the Assembly shall comprise a main and distribution busbar system, comprising of 3 phase and neutral busbar system. The rated current of the busbar system shall match the rating of the main incomer
- All main and distribution busbars, risers and droppers shall be air-insulated and shall be fabricated from hard drawn, high-conductivity copper. Aluminium busbars will not be permitted. Busbars shall be tinned for wastewater treatment works (WWTW) applications. If pre-tinned copper work is provided, cut surfaces may remain bare, providing the current path is unaffected and suitable contact lubricants are used before tightening joints.
- Main busbars shall be enclosed together within the top of the Assembly. No other conductors shall be run in the busbar compartment. Access to the busbars shall be through covers, requiring the use of a tool for removal. All internal fixings shall be held captive. No components shall be placed in a busbar compartment.
- Main and distribution busbars shall be continuous over each section, extending to over the full length of the Assembly with the same current rating and cross-sectional area throughout their length.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Main busbars, distribution busbars and all flexible connections, shall be adequately sized, braced and supported to withstand any electromagnetic forces and thermal effects to which they may be subjected, including the occurrence of fault currents, up to the full fault levels specified.
- The vertical riser buses shall be copper full height and rated for the section total load. Small openings in the vertical barriers shall permit the plug-on control unit contacts to pass through and engage with the vertical bus bars. Unused plug-on openings in the vertical barriers shall be equipped with plastic snap-in closing plugs.
- All busbar connections shall use joints secured against loosening. Joints and Tee-off connections in busbars shall be made by means of high-tensile bolts, nuts and approved locking washers. A minimum of two such bolts shall be used per joint or tee. The joints shall not be taped in order to facilitate visual inspection and checking of bolt tensions. The joint contact areas shall be smooth, very flat and polished or tinned for dry jointing.
- Busbars shall be provided with phase colour markers, red, white, blue (and black in the case of four wire systems). Such colour identification may take the form of coloured bands at intervals along the busbar run of not more than 800 mm. The combined width of the colour bands per phase shall not be less than 300 mm per 800 mm busbar length. The use of the convention, Red, Rear, Right shall be employed
- The maximum length of any cable connections from a busbar shall be 1000 mm.
- A cabled 'busbar' system of the specified radial or closed ring arrangement may be offered as an alternative to a conventional system if:
 - The Assembly has a rated short-time withstand current or rated conditional short-circuit current not exceeding 10 kA; or
 - The Assembly is protected by current limiting devices having a cut-off current not exceeding 17 kA at their rated breaking capacity.
- This will generally mean that the rated current of such an Assembly will be less than or equal to 100 A.

C3.3.4.2.4.7 E100.4.7 INTERNAL WIRING AND FILLED CONNECTIONS

a) General

- All wiring within the Assembly shall run directly between terminals, without any joints or other connections. Wiring shall be carried out using multi-strand, single-core PVC-insulated copper conductor, 660/1 000 V grade (minimum), to SANS 1507, sized and de-rated where required for the currents to be carried. Single-stranded conductors shall not be used, and no conductor shall be less than 1.5 mm² cross-sectional areas.
- Field wiring connections will be identified by others using the field device tag references. This information will be provided by the Engineer, and the Contractor shall use these field identifiers when identifying the compartment field terminations.
- Wiring layout shall permit alterations to individual circuits without requiring shut down of the complete Assembly.

b) Cable Ways inside Assembly

- All bus wiring and interconnections between compartments within the Assembly shall be contained within the enclosure and shall be segregated in wire-ways separate from other compartments. Where such wiring is terminated in a compartment, it shall be segregated

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



from all other wiring in that compartment. All wiring and cabling entering or leaving a compartment or passing through a partition shall do so via a permanently fixed bush.

- Wiring between components shall be:
 - carried out in a neat and systematic manner
 - contained in non-metallic trunking
 - Run to compartment doors in spiral wrapping.
- Any wire containment system shall securely locate the wiring and provide 25% spare capacity on completion. Cableways shall have furthermore sufficient space to enable the installation and removal of any cable without the need to remove any other cable or component. Cableways shall incorporate adequate facilities to locate and support the cables.
- Wiring on compartment doors shall be similarly supported and shall be provided with support and protection across the door to compartment side wall transition, whilst permitting the door to be fully opened without straining the wiring. Wiring system accessories shall not deteriorate with heat or propagate flame.
- Wiring shall be segregated according to need; circuits that enter the compartment without isolation shall be separately segregated and loomed with spiral wrapping and identified. Control circuits shall be wired in twisted pairs or screened cables, and together with data network cabling, shall be physically segregated from power circuits by barriers. If lightning and/or surge protection measures have been used to protect individual circuits, these circuits shall be segregated from the wiring of other unprotected circuits.
- Cable-ways or chambers shall not contain any equipment or components.
- Where field cables are terminated other than in the base of the enclosure, cable-ways or cable chambers shall be provided to transport the cables through the enclosure to the compartment or cable box at which they are glanded or terminated. Careful thought should be given to the termination of power cables and their location within the assembly.

c) Gland Plates

- All field cables and wiring shall enter the enclosure through gland plates, which shall be located so as to facilitate the spreading of cable cores.
- Gland plates shall be rigidly supported and maintain the IP rating of the enclosure
- Gland plates and cable boxes shall minimize the effects of eddy currents and be suitable for the type of cable used. Single core cable gland plates shall be made of non-magnetizing material.
- Gland plates for bottom access cabling shall be located at least 300 mm above the finished floor level.
- Each compartment gland plate shall be an integral part of the construction of that compartment

d) Identification

- All wires shall be identified at both ends using colour coded alpha-numeric ferrules. Within a compartment, a wire shall have the same identifier at both ends; and this identifier shall not be duplicated within a functional unit.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Components and wiring shall be installed such that the identification of every wire is clearly visible and readily accessible on completion of the Assembly installation at site. Horizontal wiring identifiers shall be read left to right, and vertical wiring identifiers shall be read bottom to top.
- All conductors shall be identified in conformity with the approved circuit and connection diagrams. No number shall be used more than once in each panel except where electrically identical. Wires/conductors shall have the same number on either end of the wire and all wires which are electrically identical shall have the same wire number
- Circuit wiring shall be coloured in accordance with the following:

Table 11: Colour code for wiring

Wire colour	Function
Red (white, blue)	Red (white, blue) phase connections in current and voltage-transformer circuits or connections in red (white, blue) phase power circuits
Black	Neutral (star-point) connections whether earthed or unearthed insulated wires
Red / black	Connections in AC control circuits (black = neutral)
Red / black	Connections in DC control circuits (black = negative)
Green and yellow	Earth wires and earthing

- Power-circuit conductors shall be coloured according to the phase to which they are connected.

e) Termination

- Wiring shall be terminated using crimped cable ends, lugs or any other approved method that is appropriate for the conductor size and type of termination. All of the strands forming the conductor shall be connected at the point of termination. Soldered connections shall only be used on electronic equipment where it is not practicable to use any other termination method.
- Wiring with a cross section area of less than or equal to 6 mm² shall be terminated in terminals mounted on DIN rail. Wiring with a cross section area of greater than 6 mm² shall be terminated in bolted terminals.
- All wiring entering or leaving a compartment shall do so via terminal rails, with the exception of specialised signal or data circuits, which may be cabled directly to dedicated connections on electronic equipment located at the periphery of the component mounting plate.
- The conductor shall be clamped in such a manner that the captive clamping screw does not come into contact with the conductor. Alternatively, screw-less spring clamp tensioning terminals may be used to terminate single conductors of up to 10 mm². Conductors of cross-section above 16 mm² shall be terminated using stud type terminals; similarly mounted and grouped on DIN rail.
- No more than two conductors shall be connected to one side of a terminal. Where it is necessary to connect adjacent terminals together, proprietary shorting bars or combs shall be used.
- Spare cores shall be terminated at both ends or tied back but shall not be cut short.
- All terminals shall be protected to IP2X, including stud type terminals; which shall be shrouded to achieve this. Terminals shall be segregated according to function and operating

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



voltage; by grouping or by terminal rail mounted partitions or barriers. All stud type terminals shall be provided with individual segregating barriers.

- All circuit terminal rails shall include 10% spare space.
- Terminals shall be grouped together and segregated according to operating voltage and function by terminal rail mounted barriers. Stud type terminals shall be provided with individual segregating barriers.
- Terminals shall face the compartment door for ease of connection.
- Terminals shall be located and spaced so as to enable the easy disconnection and reconnection of conductors, whilst providing sufficient space for the looming and spreading of cable cores. Where practicable, the layout of terminal rails shall be such that cores from the same field cable are not split between non-adjacent groups of terminals.
- All wiring of external connections shall be brought out to individual terminals on a readily accessible terminal block.
- All spare contacts are to be wired back to terminals.

C3.3.4.2.4.8 E100.4.8 LOW VOLTAGE EARTHING

a) Main incoming earth terminal

- The Assembly shall incorporate facilities for connecting to the main incoming earth terminal, subject to its location being clearly identified and easily and safely accessible with the Assembly energized. The Assembly earthing system may comprise either an earth bar extending the full length of the Assembly or, for Assemblies with less than or equal to two (2) functional units and a supply rating of less than 100 A, a stud arrangement.
- Earth bars shall:
 - be manufactured from high conductivity copper (tinned for WWTW applications);
 - be located in a safe and easily accessible position;
 - have a minimum number of joints;
 - have at least one disconnecting link;
 - have facilities for connection to the main incoming earth terminal (the Supply Company earthing system and / or from a local earth electrode system) at each end of the bar, and
 - be rated and tested at a minimum of 60% of the busbar fault withstand capacity
 - have a cross-sectional area of not be less than 500 mm², nor less than 50 mm in width.
 - be securely connected in each panel or cubicle to bare metal
- Provision shall be made for the connection for the following connections to the fixed portion of the earth bar:
 - electrical installation main bonding conductors
 - functional earthing conductors external to the Assembly

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- equipotential bonding conductors external to the Assembly
 - other equipment protective conductors external to the Assembly
 - the Assembly main earth bar / circuit, which shall be terminated onto the fixed portion
 - an additional 2 No. spare terminations
- All metallic non-current carrying parts of the Assembly shall be bonded together and connected to the Assembly earth busbar.

b) Compartment earthing

- Each compartment shall include an earth stud connected to the main earth bar or stud by separate connections or by a common vertical earth tape. Earth conductors to each compartment shall be sized to withstand the fault level, subject to a minimum cross-sectional area of 6 mm².
- The following shall be directly connected to the compartment earthing terminal by earthing conductors with a minimum cross sectional of 4 mm² or braided straps of similar rating:
 - compartment door
 - any removable cover
 - component / equipment mounting rails and earth terminals
- A compartment may contain subsidiary earth terminals or bars to which the following circuits may be specifically connected:
 - 'clean' earths from instrumentation circuits and equipment
 - functional earths; e.g. from telecommunications equipment
 - surge protection earths; e.g. direct connections from lightning protection units
- These earth terminals or bars shall be separately connected directly back to the Assembly main earth bar with 6 mm² minimum cross-section conductor.
- Cable gland plates associated with a compartment shall be provided with an earth stud, which shall be connected directly to either the compartment earthing terminal, or to the main earth bar, with a conductor of 6 mm² minimum cross-sectional area.
- Doors having components mounted on them shall be bonded to the main structure by means of flexible copper earth connection arranged so that it cannot be trapped as the door is opened or closed. Metal hinges shall not be considered sufficient to ensure electrical continuity.
- Where cables carry low level high frequency signals, or are installed where there is a significant risk of high frequency interference; (e.g. in signal circuits connected to equipment containing power electronics), they shall where necessary have their screens / braids capacitively connected to earth in a proprietary manner, and proprietary means shall be included to provide 360° earthing for field cable braids / screens.

c) Intrinsically safe circuit earthing

- If specified on the Detail Specification, separate earth bars or studs shall be provided for connecting equipment requiring a clean earth or an intrinsically safe earth directly to the

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



main incoming earth terminal. If required, such earth bars or studs shall be located adjacent to the equipment requiring a clean earth or an intrinsically safe earth, as appropriate.

- Where Zener diode safety barriers are contained within a compartment, they shall be separately and directly connected to the main earth bar via duplicate earthing conductors; each of 6 mm² minimum cross-section. These conductors shall be clearly identified as intrinsically safe earths.

C3.3.4.2.4.9 E100.4.9 POWER FACTOR CORRECTION

a) General requirements

- Power factor correction capacitors shall be so selected and sized as to raise the lagging power factor due to induction motor loads; either individually or when summated across the Assembly, to a final corrected power factor of 0.98 lagging. When designing the system, the un-corrected power factor for each motor shall be taken as that quoted in manufacturers' literature for a high efficiency motor of equivalent rating operating continuously at its 75% duty point.
- Capacitors shall be of the non-toxic self-healing dry metallised film type. Every capacitor or group of capacitors shall be provided with integral discharge resistors to reduce the residual terminal voltage to less than 50 V within one minute of being disconnected from the supply.
- Capacitors shall be suitable for continuous connection to a three-phase low voltage industrial power supply. If the low voltage power system to which the Assembly will be connected has significant voltage waveform distortion or harmonic content or has other capacitive or inductive networks (e.g. harmonic filters) connected to it, additional information must be obtained by the Contractor via site surveys.

b) Power factor correction for individual drives

- Where power electronic soft starters are used, the sequence of the connection and de-energizing of the capacitors shall be in accordance with the manufacturer's recommendations. Power factor correction shall not be applied to variable speed drive systems.

c) Bulk power factor correction

- Where detailed in the Detail Specification, bulk power factor correction shall be provided for the whole Assembly, in a purpose designed functional unit occupying one or more compartments within the enclosure.
- Capacitors shall be arranged into banks, suitably sized to enable the incremental control of the power factor against a changing load. Each bank shall be automatically contactor controlled, in a manner that minimises switching surges, and capacitor bank status information shall be derived from the contactor auxiliary contacts. A proprietary multi-stage power factor controller, with a minimum of six steps, shall be used to monitor and sequence the switching of the capacitor banks.
- Where there is provision to supply the Assembly from a generator, automatic means shall be included that will inhibit bulk power factor correction when the generator is in use.

C3.3.4.2.4.10 E100.4.10 POWER FACTOR CORRECTION

a) Soft starting equipment

- Soft starters shall comprise a proprietary item of chassis mounted equipment, designed for installation within an Assembly. They shall be rated to continuously carry the intended motor full load current and provide the required number of starts per hour.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- The soft starter shall be thermally designed to carry the motor current until the motor protection operates, and where this cannot be guaranteed, high speed semiconductor fuses shall be provided to protect the power electronics. Where such fuses are used, a spare set shall be provided and fixed within the compartment.
- Soft starters shall be of a digital energy optimising design and shall incorporate appropriate motor protection, and where pumping circuits are being controlled, soft stop features shall be included. When the soft starter has completed the ramped application of motor voltage, a 'top of ramp' signal shall be generated.
- Soft starters shall incorporate a built-in by-pass contactor rated for the full load running current of the motor, such that on receipt of the 'top of ramp' signal, the by-pass contactor shall close and divert the motor current away from the power electronics. When running in the by-passed condition, the motor shall continue to be provided with the full protection and monitoring features afforded by the motor starter. When a controlled stop command is received, the by-pass contactor shall be de-energised, in such a manner that the control of the motor is transferred to the power electronics.
- Facilities shall be provided for the emergency stopping of the controlled motor in the shortest possible time. The emergency stop facility shall not be dependent on any software functions within the soft starter or its associated equipment and shall disconnect the soft starter from the supply by means of a full load rated line contactor fitted between the compartment isolation / protective device and the soft starter.
- Where specified in the Detail Specification, connectivity between the soft starter functional unit and other equipment or systems within the Assembly shall be via an open field device network compatible with the proposed PLC control system. It shall preferably use an interface device integrated within the soft starter, so as to provide remote network access to the full range of the soft starter's control and monitoring facilities.

b) Variable speed drives (VSDs): General

- The VSD motor starter shall comprise a variable frequency converter (VFC), phase shift transformer(s) (where required), and all other components necessary to provide the full speed and torque control of an a.c. cage induction motor over the specified operating speed range up to the
- VFCs shall either be wall-mounted, housed within a motor control centre or free-standing units within their own enclosures as specified in the Detail Specification.
- Unless otherwise specified in the Detail Specification, VFCs shall have uncontrolled rectifiers (i.e. diode front-end) with the specified pulse number (6/12/18). Either a.c. line reactors or d.c. link chokes shall be provided with all 6-pulse VFCs to reduce input current harmonics.
- Where a phase shift transformer is required to achieve the specified rectifier pulse number, the transformer shall be provided as an integral component of the VSD and, unless otherwise specified in the Detail Specification, shall be of the dry type and housed in a dedicated section of the VFC enclosure.
- VFCs shall be capable of operating under the service conditions specified in Clause 4 of SANS 61800 Part 2, and any unusual environmental service conditions specified in the Detail Specification. Functional features and performance requirements shall be in accordance with Clauses 3 and 6 of SANS 61800 Part 2 respectively as varied
- The output rating of the VFCs shall be selected to suit the associated motor and shall take into account the operating speed range.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Every VSD motor starter shall be provided with incoming supply isolation and short circuit protection as well as an input contactor if specified in the Detail Specification.
 - The VSD shall provide the specified motor protection either as an integral part of the VFC or by way of a separate motor protection relay.
- c) Where any semiconductor or special d.c. circuit fuses are used in the VFC power circuit, a spare set shall be provided. A list of all fuses, type, ordering code and supplier and supplier details shall also accompany the spare fuses.
- The VSD control system shall incorporate comprehensive diagnostics to provide fault supervision and status indication in accordance with Clauses 3.2 and 3.3 respectively of SANS 61800 Part 2 and any additional requirements specified in the Detail Specification.
 - Input/output devices and communication links shall be provided as specified in the Detail Specification.
 - The Contractor shall ensure that the suppliers of the VFC and the associated motors confirm that their standard equipment is fully compatible and, if not, that the necessary equipment design changes (e.g. enhanced motor insulation) and/or supplementary equipment (output filters or reactors) is provided to ensure compatibility.
 - The Assembly shall permit adequate heat rejection from the VSD compartments and the Contractor shall provide estimates of the total heat rejection from the Assembly. The location of the Assembly and VSD panels, and the ventilation arrangement, shall be as specified in the Detail Specification.
- d) Variable Speed Drives (VSDs): EMC Requirements
- All VSDS shall comply with the requirements of product standard SANS 61800-3 for Category C2/C3 as appropriate and an EMC filter shall be provided as part of a VFC if necessary, to achieve the required electromagnetic compatibility.
 - The supply voltage distortion limits specified in the Detail Specification shall be achieved through the use of diode front-end VFCs with higher pulse numbers, active front-end VFCs or harmonic filters. Documentary proof shall be provided with the Tender that the VFC input current harmonics will be limited to the required levels.
 - When specified in the Detail Specification, the Contractor shall carry out a harmonic survey at the point of supply to measure background voltage harmonics. The Contractor shall repeat the survey after the commissioning of all VSDs to demonstrate that the actual harmonic performance of the VSDs under worst case operating conditions does not exceed the specified limits.
 - Any VFC input harmonic filters or line reactors and any output filters (i.e. dU/dT, common mode or sine filters) or reactors shall be provided as part of the VFC and shall be included in the supply price. Output filters shall be provided where required to ensure motor insulation compatibility and/or control of bearing currents. Output reactors shall be provided if motor supply cables exceed the allowable length.
 - The design of dedicated VFC input harmonic filters shall take account of the supply impedance provided in the Detail Specification, any background voltage harmonics, any other reactances (e.g. transformers) or capacitors (e.g. power factor correction), or other filters connected to the power system, so as to avoid possible resonance problems.
- e) Variable Speed Drives (VSDs): Control
- The VSD control panel / operator interface shall be mounted in the face of the VSD panel/ Assembly. Control parameter adjustment shall be easily achievable by menu-driven option

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



selections, with engineering options protected from unauthorized changes by the use of multi-level password protection.

- All operator controls and indications shall be available front of panel, either via an operator interface / keypad, or by using discrete pushbuttons and lamps, etc.
- The VFC shall incorporate on-board protection, control and monitoring features, which shall include, as a minimum, the following:
 - On
 - Unit Ready
 - Overload
 - Failure
 - Current limit
 - Over voltage
 - Manual start and stop
 - Raise and lower speed
 - Current operating status
 - Speed indication
- The VSD shall be such that when set in the 'manual' mode, operation from the control panel / operator interface shall be as follows:
 - a start command shall cause a normal ramped start up to the pre-set speed
 - a stop command shall cause a normal ramped down stop and shutdown of the drive
- All diagnostic and fault messages shall be stored, whether reset or not and it shall be possible to recall them from the operator interface/control panel.
- All VFC function parameters shall be programmable from a dedicated keypad, or via a standard programming software package installed on a standard portable notebook. A serial communications port to RS232 / RS485 standard or other network communication port shall be provided for dedicated communication with the VFC, and via which all programmable, control, monitoring and diagnostic functions available locally at the VFC shall be accessible
- A copy of the configuration /standard programming software shall be provided with each VSD.

C3.3.4.2.4.11 E100.4.11 CONTROL CIRCUIT SUPPLIES

a) Provision of control circuit supplies

- Fixed pattern functional units shall incorporate individual control circuit supplies that are derived from within the functional unit.
- Control circuit supplies shall be 230V AC (single pole and neutral) or 24V DC as specified in the Detail Specification. They shall be separately derived from double wound transformers, which where practicable shall have 400V primary windings. Double pole primary winding protection shall be provided by fuses or a miniature circuit breaker.

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- The rating of each control transformer shall exceed the sum of the foreseeable maximum continuous load (which for an electromagnetic device shall be the 'hold-in' VA) plus the in-rush.
- Control circuit supplies shall comply with SANS 60204-1, and the neutral terminal of each transformer secondary winding shall be provided with a removable link and shall be connected to earth. Secondary winding overcurrent protection shall be provided.

b) Control circuit features

- One pole of every contactor and auxiliary relay coil, timer, etc. shall be connected directly to the neutral (i.e. earthed) side of the control supply. Each control circuit shall be sectionalized and arranged such that where practicable, discrimination is achieved under fault conditions.
- Where possible, common controls and ICA compartment circuits shall operate at 24V DC and shall interface with the functional unit 230V AC control circuits by means of 24V DC interposing relay(s) located in the functional units.

C3.3.4.2.4.12 E100.4.12 SIGNS AND LABELS

a) General

- Safety signs and labels shall be provided wherever necessary in relevant languages so as to unambiguously communicate safety and functional guidance to any person who may operate the Assembly or otherwise come into contact with any part of the electrical system forming a part of the Assembly, and shall be provided for the specific identification of every component contained within the Assembly.
- Signs and labels shall be located in such a manner that:
 - it is obvious as to the nature and location of the hazards or component(s) to which they relate
 - when mounted on any enclosure cover or plate, there is no possibility of that cover or plate being interchanged with any similar item on that Assembly or on any other Assembly supplied to the same site
 - they are not fixed to easily removable parts (e.g. trunking covers, etc.), unless their purpose is to warn of the consequences of removing a removable part
 - they are at all times adjacent to the item to which they refer, and accommodate situations where components could be moved along a DIN mounting rail
 - they will not be obscured by any equipment, components, or wiring, etc.
 - they are legible and will remain easily read throughout the life of the Assembly
 - Signs and labels shall be securely and permanently fixed using an appropriate number of corrosion resistant, mechanical fixings. The fixing of labels, safety signs and notices shall not affect the IP rating of the Assembly.
- Short individually fixed labels covering several items only, shall be used in lieu of long multi-legend labels; e.g. above a row of indicator lamps.
- Self-adhesive, vinyl safety signs may be used if there is no requirement for special legend and propriety safety signs are available.

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Safety signs and labels shall be of such size that the legend thereon is clearly legible from the operating position (or a 3m distance), and the pictograph and its accompanying text shall be chosen so as to provide the appropriate communication in an explicit and unambiguous manner.
- Safety signs and labels fixed to the outside of the enclosure shall be manufactured from 1.5mm thick anti-reflective polycarbonate with the legend reverse screen printed, or alternatively from 3mm thick bevel-edged clear Perspex rear engraved with black characters. Internal labels may be manufactured from a laminated plastic material which shall normally provide a black legend against a white background. Where specifically agreed with the Engineer, internally mounted labels and charts, e.g. for distribution boards, etc., may be of permanently printed plastic, plastic laminated thin card, or thin card protected behind Perspex.

b) Safety Signs

- As a minimum, safety signs shall be fitted to removable covers over busbars and live connections, and to doors of compartments containing:
 - incoming supply cable termination points
 - internal switching and isolation devices
 - incoming or internal means of isolation; stating the highest voltage controlled by the means of isolation
 - functional units incorporating capacitors
 - more than one supply or multiple control circuits originating elsewhere
 - equipment located in a 'safe area' but associated with certified apparatus located in a hazardous area; a sign shall also be fitted at the safe area cable termination rail.
- A safety sign identifying the operating voltage shall be placed in any compartment where there is equipment, components, or wiring, that can be energized at above extra low voltage.
- Where there is no suitable standard symbol or pictograph, an application specific sign may be produced using simple and appropriate symbols, pictographs, and text, to indicate the hazard in a simple and straight forward manner that is acceptable to the Engineer.
- Multipurpose signs shall be used where there is a need to communicate multiple hazard messages.

c) Labelling

- The text of every label, excluding individual internal component identification labels, shall be as agreed with the Engineer.
- Every Assembly shall be provided with a name plate detailing the following:
 - Manufacturer's name or trademark
 - Manufacturer's contact details
 - Manufacturer's type designation, serial / identification number
 - Date of manufacture

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- Rated operational voltages, frequencies, and number of phases
 - Continuous busbar rating
 - Short circuit withstand current and duration
 - Cascading label
 - IP rating
- An application name shall be prominently displayed on the Assembly, as detailed in the Particular Specification.
- Each compartment shall be identified with a designation label which shall include the full plant functional name and the alpha numeric tag-number, kW rating, full load amp rating. For rear access Assemblies, a duplicate designation label, mounted adjacent to the gland box, shall also be provided at the rear of each compartment.
- The material used shall be selected having regard to the size and fixing methods of the label and the label shall not warp in service. Labels mounted on the outside of the Assembly shall be rectangular in form and be manufactured of either:
- Laminated plastic, engraved so as to produce black letters on a white background
 - Engraved sandwich board ("Trifoliate", "Darvic" or equal)
 - Reverse engraved acrylic material ("Perspex") with filled letters and reverse sprayed
- For outdoor applications (where specified) labels shall be brass or aluminium (with letters filled in black), lightly sanded with fine grit paper and clear lacquered
- Labels for door mounted components and labels used inside the Assembly shall be to the same standard or may alternatively be printed using an approved, propriety system.
- Text characters shall be uniform in height, in upper case (except where standard abbreviations of units are used, e.g. kWh, kVA, etc.) and of the following minimum dimensions:
- application labels: 8mm
 - compartment designation labels: 6mm
 - information or warning labels: 6mm
 - component identification labels: 3mm
- All components shall be clearly labelled. Internal components shall be clearly identified by individual labels to indicate the equipment to which they relate. The component identification labels shall correlate with the Assembly drawings and documentation. If this is not practical due to space restrictions, common labels (e.g. diagrams may be used).
- Current transformers shall be provided with separate and individual identification and rating plates.
- Each distribution board shall be provided with a circuit chart laid out in a way that matches the orientation and layout of the protective devices in the distribution board.

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Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- A typed circuit chart shall be permanently fixed inside each Assembly or immediately adjacent to the distribution board. The chart shall be laid out in accordance with the physical arrangement of the protective devices that it is easy to relate the circuit chart details to the appropriate protective device. As a minimum, the chart shall be enclosed in a transparent protective cover attached to the inside of the compartment door.

C3.3.4.2.4.13 E100.4.13 INSTALLATION REQUIREMENTS

a) Shipping

- Assemblies shall be shipped in sections to facilitate field handling for transportation and installation. The shipped sections shall be joined together to form a complete unit assembly.
- Preparation for shipment shall protect the Assembly auxiliary devices accessories, etc. against corrosion, breakage or vibration injury during transportation and handling.
- Disassembly shall be into the largest components or sub-assemblies possible, consistent with packing, road transport and handling limitations.
- All parts shall be clearly and lastingly match marked to facilitate field erection prior to disassembly and packing for transport. Instructions shall be provided for reassembly of sections in the field or accompanied by a qualified representative from the Assembly Manufacturer.
- The Contractor shall be responsible for delivery including loading and unloading of all equipment to site.
- The Contractor shall provide information (in time) regarding specialised handling and storage requirements/techniques for equipment on the site until finally installed in the operating location.

C3.3.4.2.4.14 E100.4.14 LOCAL CONTROL PANELS

a) General requirements

- The START/STOP pushbutton or control station shall be mounted adjacent to the drive.
- The enclosure incorporating the pushbuttons, selector switches and indicating lights shall be fully water, weather and vermin-proof and shall have a minimum rating of IP65. The enclosure shall be manufactured from 3CR12 and shall be painted B26 to SANS 1091.
- All pushbutton control station shall be pedestal mounted on a bracket at least 1 000 mm above ground/floor level.
- All START pushbuttons shall be green and the operator shall be flush with the surrounding bezel.
- All STOP pushbuttons shall be a red mushroom head latching push button and shall serve as an emergency stop.
- All selector switches shall be rotary selector switches with black operators.
- The control/pushbutton station shall be adequately designed to provide space for the following:
 - The required pushbuttons, selector switches and indicating lights complete with their appropriate labels.

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- Termination of all control wiring associated with the drive or group of drives. The minimum terminal strip length is 150 mm. A single multicore control cable shall be installed from the Assembly to the station, from where the required signals will be individually wired.
- Stations for submersible equipment shall in addition of the required control cables, also provide for the termination of all the required power cables.
- Sufficient space shall be provided for the glanding of the required cables.
- All further requirements pertaining to the design, construction, installation and commissioning of control panels (e.g. Labelling, earthing, commissioning, etc.) shall be as specified in the relevant subsections of this Specification.
- Start/Stop pushbutton stations
- In addition to the above general requirements, START/STOP pushbutton station shall confirm to the following additional requirement:
 - One START pushbutton
 - One STOP pushbutton, The STOP pushbutton shall be twist to release.
 - Where reverse local control is required the reverse button shall not latch unless required.

C3.3.4.2.4.15 E100.4.15 FUNCTIONAL DESIGN

a) Specification to the Contractor

The Engineer shall provide the Contractor with the following information, which will form the basis for the design of the Assembly:

- The Particular Specification
- The Detail Specification will detail all project specific requirements.
- MCC and Local Control Table
- The MCC and Local Control Table will be a schedule of all external connections and their function, ratings, etc. It gives an indication of each load's kW rating and the relevant circuit breaker size that must be selected. Also stated will be the type of starting, the local visual indication and the requirements for manual, automatic and local control needed.
- I/O Schedule
- The I/O Schedule will detail all the input and output signals (analogue and digital) for the controller connections, and the relevant equipment part it connects to.
- Technical Data Sheets
- The Technical Data Sheets are intended for use as standard templates, which will be completed and inserted into the Detail Specification documents, so as to detail the project and product specific requirements for each Assembly as a whole, and for its constituent functional units.
- Project specific configuration of the Technical Data Sheets will take the form of a 'YES' 'NO', insertion of a value or, together with the provision of an associated Particular

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
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Specification clause, cross-reference, or stated requirement, etc., as appropriate. When compiling a Detail Specification document, only those Technical Data Sheets applicable to the required functional units will be included.

- One set of Technical Data Sheets will be prepared per Assembly, unless therein detailed otherwise. Individual Technical Data Sheets may be duplicated if applicable, in order to accommodate the extent of scheme specific information.
- Control Philosophy
- The Control Philosophy will detail the functionality of all control and automation systems.
- Cable Block Diagram
- The cable block diagram is a schematic that shows how the components of the Assembly is connected to the equipment and motors that it controls. It also indicates starting method, cable and circuit breaker sizes.
- Assembly general arrangement drawing
- A proposed layout shall be provided for the Contractor as indication of the relevant size constraints for the Assembly. It shall also indicate the number of functional units (e.g. motor starters, feeders, etc.) that is required for the Assembly.
- Building arrangement drawing
- A drawing indicating the Switchgear-room layout shall be used for functional considerations of the Assembly design. This drawing could be provided under the civil part of the project.

C3.3.4.2.4.16 E100.4.16 TESTING AND COMMISSIONING

a) General requirements for testing

- On completion of manufacture, the Assembly shall be subjected to a factory acceptance test (FAT), comprising the Manufacturer's in-house tests, and the repeat tests witnessed by the Client and the Engineer.
- Once the witnessed FAT has been carried out, signed off, and any remedial works have been completed and re-tested, the Assembly is ready for delivery to site. Once erected in position, the Assembly shall be subjected to a witnessed site acceptance test (SAT).
- Once the SAT has been carried out and signed off, any remedial works shall be completed and re-tested. Plant installation and site cabling will then be carried out by others, and on its completion, witnessed commissioning shall commence.
- The manufacturer shall allow for each test (apart from in-house tests) to be witnessed by both the Client and the Engineers simultaneously. An individual testing activity shall not be considered to have been completed until any results have been recorded, and it has been signed off by the Engineer.
- The manufacturer shall provide the Client and Engineers with all reasonable facilities, including testing staff and test equipment, to carry out the inspections and tests, and to check the Assembly for compliance with all of the Client's requirements.
- The manufacturer shall ensure that all testing is carried out in a safe manner and shall protect those witnessing from danger; in accordance with the Occupational Health and Safety Act.
- In order to demonstrate the functionality of each circuit, external devices shall be simulated in a representative manner. A small motor shall be used as a test load where motor starters

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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incorporate power electronics. During development, software may be electronically verified away from the Assembly using a simulation / diagnostic package; notwithstanding this, control systems shall be witnessed tested with the software loaded into the programmable devices, and with simulation of the physical I/O devices.

- Where the Assembly incorporates equipment requiring special testing facilities or procedures, the manufacturer shall ensure that appropriate resources are available; including where necessary, representatives from the equipment Manufacturer.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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PROCEDURE FOR TESTING AND COMMISSIONING

Action	Action By	Documentation
Design Assembly	Manufacturer/Contractor	
Check	Engineer	SLD drawings, Assembly GA drawings
Manufacturing	Manufacturer/Contractor	
In-house FAT	Manufacturer/Contractor	In-house FAT document
FAT	Manufacturer/Contractor/ Engineer/ Client (If required)	Final FAT document, Functional Specification required)
Delivery to Site	Manufacturer/Contractor	
SAT	Manufacturer/Contractor /Engineer	SAT document
O&M Manual & COC	Contractor to provide to Engineer	Draft Copy of O&M manual COC
Check	Engineer Contractor provides O&M Manuals	3 Copies of approved O&M manual
Final Test & Commissioning	Manufacturer/Contractor /Engineer/Client(If required)	Commissioning Test document

FAT: Factory Acceptance Test; O&M Manual: Operating & Maintenance Manual; SAT: Site Acceptance Test; COC: Certificate of Compliance

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



b) Factory acceptance tests (FATs)

- The manufacturer shall perform his in-house works tests in accordance with the proposed FAT procedures and shall satisfy himself as to the accuracy and quality of the manufactured Assembly in accordance with the accepted design. Once the in-house FAT has been carried out, signed off by the manufacturer, and any remedial works have been completed and re-tested, the tests shall be repeated and witnessed by the Client (if required) and the Engineer.
- The in-house and the witnessed FATs shall check compliance with SANS 60439-1, and shall include the following:
 - A thorough external and internal visual inspection.
 - Confirmation of adequate earthing.
 - Secondary injection testing of all protective circuits shall be carried out, except where discrete current transformers are used; in which case sufficient primary injection testing shall be carried out to prove the ratio and the polarity.
 - Meggar tests shall be performed across all main and distribution busbar joints.
 - All busbars shall be subjected to a single witnessed reduced voltage dielectric 'flash' test; the in-house test shall also be at a reduced voltage.
 - All power circuits shall be subjected to insulation resistance tests.
 - The operation of every mechanical device and interlock shall be verified.
 - All circuits and their functionality shall be tested as detailed in the Control Philosophy and MCC and Local Control Table.
 - Any other test necessary to verify satisfaction with the requirements of Table 7 of SANS 60439-1.
- When testing the performance of any software, it shall be demonstrated using the hardware intended to be incorporated within the Assembly, and where this is not possible appropriate operator interfaces, programming units, and terminal units, etc. shall be provided. Where it is necessary to demonstrate an interface with a piece of unavailable equipment to be supplied by others, appropriate means to replicate that equipment and simulate the interface shall be provided.
- The Engineer preserves the right to cancel and postpone tests if he finds that the Contractor has not made reasonably sure that the test will be successful. Any extra costs incurred shall be borne by the Contractor.

c) Site acceptance test (SAT)

- All equipment and every circuit that was altered or disturbed subsequent to the completion of the FAT, or for shipping and site erection, shall be specifically re-tested for integrity and functionality.
- During the SAT, all busbar joints that are re-tightened on site shall be subjected to a further Meggar test, and all busbars shall be subjected to a single witnessed full voltage dielectric 'flash' test.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- The process functionality of each aspect of the control system and its operator interface shall be demonstrated, including the correct operation of all I/O and network links external to the Assembly or not otherwise tested during the FAT.
- A COC shall be provided to the Engineer, before final Testing and Commissioning can start.

d) Commissioning and other tests

- The manufacturer shall provide attendance during the commissioning of the Assembly, whereby the functionality of the Assembly and its control system and software shall be proven. During commissioning the manufacturer shall make such adjustments, software modifications, and circuit changes, as are deemed necessary to provide the level of plant functionality and performance specified by the Client. All such changes shall be immediately incorporated into the 'as installed and tested' documentation and the Operating and Maintenance Manual, by the Contractor.
- The manufacturer shall provide an acceptance document, to detail and record the tests and their anticipated results, and the acceptance document shall have provision for recording and signing off the results.

C3.3.4.2.4.17 E100.4.17 DOCUMENTATION AND TRAINING

a) General

- All drawings, information, and documentation shall be in English, and each item shall be identified with:
 - the Client's name and contact details
 - Client's project / scheme / contract reference title and numbers
 - the Engineer's name and contact details
 - Engineers reference numbers
 - Contractor's works / contract / order references.
- Drawings for acceptance shall be provided on A4 or A3 paper copies as specified.

b) Drawings for Approval by the Engineer

- The following documentation and drawings shall be submitted to the engineer prior to the procurement or manufacturing of Assemblies and related equipment:
 - Cable block diagrams.
 - General arrangement and elevation drawings, compartment door layouts, typical component mounting plate layouts, and foundation plans.
 - Electrical schematic diagrams showing all equipment and components incorporated into the Assembly. Known circuitry outside of the Assembly and connected to it, shall be shown on all drawings. Drawings shall be cross-referenced using a grid / line reference system.
 - Protective device grading for overcurrent, short circuit, and earth fault / leakage devices incorporated within the Assembly, together with a schedule of proposed settings that will ensure discrimination.

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Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- PLC software and configuration documentation; including ladder logic diagrams and HMI display screens, etc. The documentation shall be complete and annotated with purpose, function, duty, cross-references, and descriptions, etc.; sufficient to guide an unfamiliar person through the operation of the software.

c) Testing Documentation and Reports

- The FAT and SAT shall be according to BS EN 62381.
- A factory acceptance test (FAT) document shall be provided to the Engineer prior to the witnessed FAT. This documentation shall show the manufacturer's in-house test procedures and results for all items of equipment, components, hardware, and software. The document shall show hardware checks, the software simulation procedures, and their combined functional testing. It shall comprehensively and clearly show the test results of the in-house testing. The subsequent report of the FAT witnessed by the Engineer shall be appended to this documentation.
- The Contractor shall provide his own testing report template to document the FAT witnessed by the Engineer. This shall be to the satisfaction of the Engineer.
- A site acceptance test (SAT) document shall be produced, which shall detail all tests necessary to demonstrate the functionality of the Assembly following its final erection on site. This shall include details of tests and checks on all circuits disconnected for shipping, together with any equipment, components, wiring, or software altered or incorporated into the Assembly; following the completion of the witnessed FATs.
- All drawings, schedules, listings, and other design documentation for acceptance shall be supplied as a comprehensive and integrated package and collated into folders; unless otherwise agreed with the Engineer. Three copies of appropriate documentation shall be submitted on each occasion that agreement is sought.
- A Certificate of Compliance (COC) shall be provided for all new Assemblies. For all refurbished Assemblies, a letter shall be provided listing all the repairs and stating that the Assemblies are still deemed to be reasonably safe.
- The FAT, SAT, and COC shall each have been submitted and agreed with the Engineer, prior to the commencement of final testing and site commissioning.

d) Certificate of Compliance

- A Certificate of Compliance (COC) shall be provided for all new Assemblies. For all refurbished Assemblies, a letter shall be provided listing all the repairs and stating that the Assemblies are still deemed to be safe.
- The original COC shall go to the client's electrical representative.
- A copy of the COC shall be included in the O&M Manual.

e) Operating and Maintenance Manual

- One copy of the draft operating and maintenance manual and spare parts list shall be provided at an agreed date; in advance of the date of the start of the final testing and commissioning SATs, for acceptance by the Engineer. Three copies of the final editions shall be provided to the Engineer by an agreed date before successful completion of final testing and commissioning.
- The Operating and Maintenance Manual shall be bound into a suite of hard-backed ring binders and shall be provided with an index of all drawings pertinent to the Assembly. The

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



index shall include each drawing's origin, number, issue, status, and the Client's drawing number (where issued by the Engineer).

- The Operating and Maintenance Manual shall include the following:
 - All design drawings and documentation relating to the Assembly; as delivered and tested.
 - 'As installed and tested' records showing verification against stated design and installation criteria, including a schedule of all the final settings for all user adjustable equipment and components, and copies of all documentation presented and completed during the FATs, the SATs, and any other specified tests on completion.
 - Schedules of plant and equipment for each compartment / circuit; including a listing of the applicable standards, manufacturer, settings, type number, re-order code, etc., for each item of equipment and component included within the Assembly.
 - Manufacturers' contact details, technical information sheets for all items of equipment and components included within the Assembly. Manufacturers' catalogues may be provided subject to clear identification of the relevant components. All individual manufacturers' equipment / component test certificates and certificates of conformity shall be included.
 - Inspection, testing, and maintenance recommendations, including detailed and specific operation, maintenance, and diagnostic data, and safe isolation information suitable for use by maintenance personnel, shall be provided for all equipment, components, and systems incorporated into the Assembly.
 - Schedule of spares provided with the Assembly, including manufacturer, description, part number, order code, and quantity.
- The Operating and Maintenance Manual shall include detailed descriptions for use by the Client, on how the controlled plant and its management systems are intended to operate and be operated; under both manual and automatic control. Clear and detailed descriptions for each element of the Assembly shall be provided; and shall include system objectives, controlled plant start-up and shut-down procedures, automatic control, manual intervention, primary and secondary control routines, plant selection including duty and standby options, local and remote selections, operational and safety constraints, status information, alarms and control interfaces with control systems, fault routines, etc.
- The Operating and Maintenance Manual shall include 'as-installed and tested' information on both the hardware and software for each programmable device incorporated within the Assembly, including:
 - Overview of system operation in relation to the controlled plant.
 - System configuration.
 - Manufacturers' literature on operation, maintenance and testing of hardware and ancillaries, programming instructions, and diagnostics.
 - Hard copy program; with listings fully documented.
 - Listing of the final settings of all process dependent variables.
 - Permanent back-up copies, licensed in the name of the Client, shall be provided for all software, including operating programmes, application programs, and configuration software for all configurable devices.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Any interconnecting leads, protocol conversion modules, connectors, etc. necessary to connect and communicate with each programmable / configurable device to a standard portable Notebook.
- Manual format shall be A4 size on the filing side which shall be vertical with 20 mm margin for filing.

e) Training

– General

- The LV switchgear and Control Gear training shall form part of the overall training programme.
- The Contractor shall conduct training courses for designated personnel in the maintenance and operation of the Assemblies.
- The Assemblies shall be in a complete working order before training shall commence.
- A training schedule, together with the name and background of the person who will perform the training, shall be submitted to the Engineer for approval.
- Training and training manuals shall be based on the O&M Manuals.
- Training manuals shall be delivered for each trainee with two additional copies delivered for archival at the project site. The manuals shall include an agenda, defined objectives for each course.
- Where the Contractor presents portions of the course material by audio-visuals, copies of those audio-visuals shall be delivered to the Employer as part of the printed training manuals.
- The Employer reserves the right to videotape the training sessions for later use.
- The training shall include operator training and technical/maintenance training.
- During the installation phase, a person will be designated by the Employer to be closely involved with the installation and commissioning process. The intention is not to interfere with the Contractors' installation team, but to do observation in order to obtain the maximum possible information regarding the installation, to enable efficient maintenance to be undertaken by the Employer after final hand-over and expiring of the guarantee period.

f) Operations and Maintenance training sessions

- There shall be training sessions for the operation and maintenance of the Assemblies
- The program for the training shall include instruction for at least one day per Assembly (8 hours) instruction on-site.
- The program shall at a minimum cover the following:
 - General system overview
 - Functional operation of the system i.e.:
 - i) System start-up and shut-down procedures

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- ii) System access requirements
- iii) Alarms
- iv) Fault Finding
- v) Backup Power Procedure (if applicable)
- vi) Incident Reporting
- Maintenance
 - i) Maintenance Schedule
 - ii) Standard Maintenance Procedures
 - iii) Spare Part Lists
- Upon completion of the course, the operators should be fully proficient in the system operation and have no unanswered questions regarding the system.

C3.3.4.2.5 E100.5 LOW VOLTAGE SWITCHGEAR AND CONTROL GEAR ASSEMBLIES

C3.3.4.2.5.1 E100.5.1 SCOPE

a) Application

- This document specifies the standard requirements for the design, installation, testing and commissioning of electrical installations operating on voltages up to 1 000 Volts AC / 1 500 Volts DC.
- The primary intention of this specification is to ensure the provision of an electrical installation, which has been designed and constructed to ensure safe, reliable, operation and to facilitate safe inspection, testing and maintenance.
- Note, however, that this specification only covers such installations (or sections of installations) that are covered by SANS 10142-1. Note also that certain provisions of this specification are inappropriate for direct application to installations where additional measures (such as earthing, intrinsic safe equipment, etc.) are required by SANS 10142-1 and SANS 10108 (i.e. medical and hazardous locations). For these types of installations, thorough reference must be made to the relevant statutory documentation.

b) Electrical System Characteristics

- The design of the installation shall comply with SANS 10142-1.
- The design of the installation shall consider the following supply characteristics:
 - Voltage, frequency and number of phases
 - Maximum prospective short circuit current (phase to phase and phase to neutral)
 - Type of system, e.g. TN-S, TN-C-S
 - Maximum earth loop impedance of the earth fault path external to the installation
 - Type and rating of the cut-out or switch device

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Load capability of the supply source, particularly the effects on the supply voltage of the starting of new equipment and any fault contributions from new equipment
- The installation of protective devices shall be correctly co-ordinated within the installation and with respect to existing installations. Discrimination studies shall be performed to validate the co-ordination of the installation.
- All equipment which requires operation or attendance by a person, or requires cleaning or maintenance in service, shall be constructed and installed to allow adequate and safe means of access and adequate working space for such activities. Similarly, the positioning of equipment shall not impede access to, or working space at, non-electrical equipment and services for operation and maintenance activities.
- The installation shall be suitable for access and use by electrically unskilled persons.
- Where additions or alterations to an existing installation are to be performed, the rating and condition of existing equipment, including that associated with the supply, shall be verified to confirm its suitability to carry any additional load. The earthing and equipotential bonding arrangements shall also be verified. No addition or alteration shall have an adverse effect on the existing installation.

C3.3.4.2.5.2 E100.5.2 STANDARDS

a) Associated Documentation

- This Specification identifies the Employer's standard modifications and requirements which shall be applied to the statutory and recognized standards. The detailed specification of the project or site-specific requirements will be found in the Particular Specification and its accompanying Technical Data Sheets, which shall be read in conjunction with this Specification.
- Any items not specifically detailed in this Specification, which are necessary to provide a safe and fully operational working system, shall be deemed to be included.
- The Contractor shall operate an auditable quality assurance procedure covering the design, construction, inspection and testing of the installation.

b) Regulations, Specifications and Standards

- The design, construction, inspection and testing of the installation shall comply with all relevant Statutory Regulations and Directives including:
 - Occupational Health and Safety Act (Act 85 of 1993)
 - Construction Regulations 2003 issued in terms of Section 43 of the Act
 - Local Fire Regulations; and
 - Regulations of the Local Supply Authority
 - and the latest editions (current at the time of Tender) of all relevant South African National Standards, as well as International Standards, including but not limited to:

Employer:		Contractor:	
Witness:		Witness:	

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Part	T1	T2	C1	C2	C3	C4

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Table 12: Section 5: Reference standards

Standard Number	Description
SANS 121	Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods
SANS 156	Moulded-case circuit-breakers
SANS 164	Two-pole and earthing-pin plugs and socket outlets
SANS 475	Luminaires for interior lighting, streetlighting and floodlighting - Performance requirements
SANS 767	Earth leakage protection unit
SANS 950	Unplasticized polyvinyl chloride rigid conduit and fittings for use in electrical installations
SANS 1063	Earth rods, couplers and connections
SANS 1085	Wall outlet boxes for the enclosure of electrical accessories
SANS 1088	Luminaire entries and spigots
SANS 1091	National colour standards of Paint
SANS 1195	Busbars
SANS 1213	Mechanical cable glands
SANS 1239	Plugs, socket-outlets and couplers for industrial purposes
SANS 1266	Ballasts for discharge lamps (excluding tubular fluorescent lamps)
SANS 1411	Materials of insulated electric cables and flexible cords
SANS 1431	Weldable structural steels
SANS 1507	Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V)
SANS 1700	Fasteners
SANS 1777	Photoelectric control units for lighting
SANS 1783	Sawn softwood timber
SANS 1973	Low-voltage switchgear and control gear Assemblies
SANS 10155	Accuracy in buildings
SANS 10199	The design and installation of earth electrodes
SANS 10225	The design and construction of lighting masts
SANS 10177	Fire testing of materials, components and elements used in buildings Part 2: Fire resistance test for building elements
SANS 10142-1	Wiring of Premises Part 1: Low Voltage Installations
SANS 10400	The application of the National Building Regulations
SANS 60269	Low-voltage fuses
SANS 60309	Plugs, socket-outlets and couplers for industrial purposes
SANS 60529	Degrees of protection provided by enclosures (IP Code)
SANS 60614-2	Conduits for electrical installations - Particular specification for conduits
SANS 60669	Switches for household and similar fixed-electrical installations
SANS 60947	Low-voltage switchgear and control gear
SANS 61000	Electromagnetic compatibility (EMC)
SANS 61010	Safety requirements for electrical equipment for measurement, control, and laboratory use
SANS 61048	Auxiliaries for lamps - Capacitors for use in tubular fluorescent and other discharge lamp circuits - General and safety requirements

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



Standard Number	Description
SANS 61238	Compression and mechanical connectors for power cables for rated voltages up to 30 kV (Um = 36 kV)
SANS 61643	Low-voltage surge protective devices
Other Standards	Description
ARP 035	Guidelines for the installation and maintenance of street lighting
BS 88	Specification of supplementary requirements for fuses of compact dimensions for use in 240 / 415 V industrial and commercial electric installations
IEC 157	Low voltage switchgear and control gear
IEC 408	Low voltage air-break switches, air-break disconnectors, air-break switch disconnectors and fuse combination units
IEC 12373	Aluminium and aluminium alloys. Anodizing. Method for specifying decorative and protective anodic oxidation coatings on aluminium
IEC 50086	Conduit systems for cable management
IEC 60898	Specification for circuit-breakers for overcurrent protection for household and similar installations

- Standards are often tailored to the conditions of their country or origin (in terms of permissible voltages, expected ambient temperatures, etc.). Therefore, and unless normatively referenced to the contrary in a Standard of higher precedence, the decreasing order of precedence of Standards shall be:
 - South African National Standards (SANS, VC, etc.)
 - South African Sectoral Standards and Specifications (NERSA, CKS, ARP, NRS, PIESA, etc.)
 - ISO Standards
 - IEC Standards
 - Harmonized British Standards (BS EN)
 - Other Harmonized European National (EN) Standards (CEN, CENELEC, ETSI)
 - Non-Harmonized British Standards (BS)
 - Other international standards
- Where Standards of the same order are not in agreement with each other, the Standard with the most rigorous requirements shall apply.
- The installation shall also comply with:
 - This Specification, including all Technical Data Sheets; and
 - Any documentation issued by, or on behalf of, the Employer in respect of the Installation.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



C3.3.4.2.5.3 E100.5.3 INSTALLATION OF CABLE SUPPORTS

a) Cable Trays, Mesh and Ladders

– General

- Cable management systems (cable trays, cable ladders and cable mesh) shall be selected and installed strictly in accordance with their manufacturer's guidelines, with a safety factor of 1.5 after taking into account maximum permissible loading and all external factors (not limited to wind, snow and thermal expansion). Upon demand to do so, the Contractor shall furnish all data and calculations he used to derive the type and spans of the systems to the Engineer.
- Notwithstanding above, the deflection of a cable management system due to installed cable weights shall be, in accordance with IEC 61537, limited to 1/100th of the span.
- Except where it is to be installed in locations with corrosive atmospheres, cable management systems shall be manufactured of galvanized and/or epoxy-powder coated steel. In locations with corrosive atmospheres, systems shall be manufactured from stainless steel (316 Marine Grade) or aluminium.
- All clamps, clips, hinges screws, bolts, nuts and support fittings used for fastening cable trays or cables shall be of the same material as the cable management system itself.
- Over and above the requirements of SANS 10142-1, all cable tray and ladder systems that will support telecommunication and / or control wiring shall be bonded in accordance with NRS 083-2 (gives details of bonding methods that provide enhanced protection against the effects of electromagnetic cross-interference).
- Cable management systems shall be selected and installed such that spare capacity (weight as well as height and width) of 20% will be available for the addition of future services (the cable management system to still exhibit a 1.5 safety factor after services were added).

– Perforated Cable Trays

- All cable trays shall be of the heavy duty, increased upstand ("side-rail"), type.
- Metal cable trays shall be manufactured from base-perforated (in excess of 30% of the surface area, in accordance with SANS 10142-1, in other words, class D according to Table 4 of IEC 61537) rolled steel. Metal trays manufactured to the following standards shall be used:
 - i) Less than 150 mm wide: 1,2 mm minimum thickness with 12 mm minimum upstand
 - ii) 150 mm to 450 mm: 1,2 mm minimum thickness with 19 mm minimum upstand
 - iii) Above 450 mm (heavy duty): 2,5 mm minimum thickness with 76 mm upstand
- The edges of cable trays are to be turned up on both sides to improve rigidity (return flange cable tray), and, where necessary, the sides of trays shall be reinforced with galvanised steel angles, minimum 25 x 25 x 3 mm, with 25 x 3 mm cross-braces at 600 mm centres.
- Cable trays shall be hot-dip galvanised only after the perforation and bending processes have been completed.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



– Wire Mesh Cable Trays

Wire mesh cable trays shall be manufactured from wire, resistance butt welded on all wire intersections. The tray shall be hot dip galvanized after completion of the manufacturing process. Heavy or medium duty trays may be used, ensuring that the selection of trays is suitable for the projected loading, as per manufacturer's specification.

- Medium duty trays shall be manufactured from wires not less than 4mm diameter thick. The tray shall have a side upstand of no less than 50mm. The aperture sizes for the base shall not exceed 50 x 75 mm and 25 x 50mm for the side upstand.
- Heavy duty trays shall be manufactured from wires not less than 5mm diameter thick. The tray shall have a side upstand of no less than 75mm. The aperture sizes for the base shall not exceed 50 x 50 mm and 25 x 50mm for the side upstand.

– Cable Ladders

- Metal cable ladders shall have side rails with 2 mm minimum thickness. Cross rungs shall be spaced at maximum intervals of 300 mm (measured between the centres of rungs). Where cables of 10 mm² or smaller are installed on cable ladders, the spacing of cross rungs shall be reduced to 125 mm.
- Cable ladders consisting of slotted metal rails which accommodate plastic or metal cable binding bands may be used in vertical cable runs against walls, etc. These cable ladders will be considered in horizontal cable runs for small cables for communication and control wiring only after approval by the Engineer.

– Cable Tray and Ladder Connections

- Cable tray and ladder connections shall be suited to and of the same manufacture as the linear sections that they connect.
- The dimensions of these connections shall correspond to the dimensions of the linear sections to which they are connected.
- The radius of all bends shall be 1 m minimum. The inside dimensions of horizontal angles or connections shall be large enough to ensure that the allowable bending radii of cables are not exceeded.
- Sharp angles shall be 45° mitred.

– Installation of Cable Ladders, Wire Mesh Cable Trays and Perforated Cable Trays

- Horizontal cable ladders and trays shall be suspended from the overhead structure, such as slab soffit or roof trusses/ purlins with hangers and P2000 or similar catalogue product as cross supports, at distances not exceeding 1,2m unless otherwise specified by the manufacturer. The hangers shall be galvanized threaded rods or steel cables, which shall be arranged to support the trunking rigidly in both directions. Where fixed to a concrete slab the hanger shall be fastened by a suitably sized expandable drop-in anchor, as specified and recommended by the manufacturer. Hangers fixed to an overhead steel roof structure, shall be fastened by supplier recommended standard catalogue product hanger brackets/ beam clamps, designed for this purpose. Make-shift and or self-manufactured brackets/ beam clamps will not be accepted. No cutting, drilling or any other modification may be done to the existing overhead steel structure, to accommodate and of fasten hanger brackets/ beam clamps to the said structure.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- The use of wall mounted cantilever brackets for horizontally mounted cable trays shall be approved by the engineer, prior to installation. No installation of this mounting method shall commence, without written consent.
 - The spacing between tiers of ladders, trays and/or mesh shall be 300 mm minimum. Furthermore, they shall be installed such that a minimum separation of 300 mm exists between ceilings and the top of a tray or ladder (where the latter is installed horizontally) and 50 mm between the nearest sides of trays or ladders and the finished surfaces of walls, floors and ceilings for other configurations.
 - Fixing materials shall be compatible with cable management system materials and offer resistance to corrosion.
 - Cuts in trays shall not pass through perforations, except where practically impossible to implement.
 - Cable trays and mesh shall be mounted with a minimum air gap of 25 mm between the underside of the tray and the mounting surface.
- Installation of Cables on Cable Trays, Ladders and Mesh

Under no circumstances shall the cable support systems be used as ladders, walkways or any other form of support for people. This can lead to personal injury, possible damage to the cable support system and installed cables.

- Electrical MV and LV cables shall be installed on suitably sized cable ladders. MV and LV cables shall not share the same cable tray.
- Cables for communication and or other electronic services shall be installed on wire mesh cable trays. Cables shall be neatly bunched together by means of cable ties. Only cables of the same service (i.e. smoke detection, CCTV, audio, etc) shall be bunched together. Perforated cable trays may also be used in lieu of wire mesh cable trays. Electrical and electronic services cables shall not share the same cable tray.
- Cables shall be supported to avoid damage during installation, prior to dressing and fixing.
- Depending on the overall diameter, single cables and groups shall be secured according to the following.

Table 13: Installation of cables

Fixing method	Overall diameter of cable
Nylon UV Protected Cable Ties	< 35 mm
Propriety cable clamps	> 35 mm

- In outdoor applications, where the installation maybe subject to ultra-violet light, PVC covered aluminium tape shall be used instead of nylon cable ties.
- Cables installed in groups shall be installed in straight lines and not cross over each other, except where single core cables need to be transposed.
- Where cables exit ladders, trays or mesh, the latter shall be formed or covered with PVC to ensure a smooth surface.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Single core cables shall be installed in trefoil formation by means of non-magnetic type trefoil cable clamps. Only single core cables originating the same feeder shall be grouped together in the same trefoil formation.

C3.3.4.2.5.4 E100.5.4 DRAWINGS AND DOCUMENTATION

a) General

- All drawings, information, and documentation shall be in English, and each item shall be identified with:
 - The Client's name and contact details
 - Client's project / scheme / contract reference title and numbers
 - The Engineer's name and contact details
 - Engineers reference numbers
 - Contractor's works / contract / order references.
- Drawings for acceptance shall be provided on A4 or A3 paper copies as specified.

b) Drawings for Approval

- The following documentation and drawings shall be submitted to the Engineer prior to the installation of cables and wireways and before civil construction have started on the areas where cable routes are required:
 - Cable route layout drawings showing
 - Type of wireways
 - Trenching
 - Cable junction boxes

c) As-built Drawings

- Detailed "as-built" drawings, clearly labelled as such, and consisting of three sets of drawings printed to their original size, and, where the original drawings were larger than A3, three sets of drawings printed (with reduced scaling, but without omitting any information from the printed area), to A3, shall be provided by the Contractor, indicating positions of the following:
 - Wireways (e.g. trenches, conduit, cables ladder/trays, power skirting etc.); and
 - Cable routes (including any cable joints)
 - General arrangement drawings
 - Single Line Diagrams

d) Operating and Maintenance Manual

- Three Operation Manuals, three Maintenance Manuals and three Certification copies shall be provided for all equipment supplied. The manuals shall be in A4 format.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- The operating and maintenance manuals shall include at least the following:
 - A schedule of installed components and equipment, containing the following information:
 - Manufacturers name and contact details
 - Circuit number (DB name, circuit breaker e.g. DB01-CB08); and
 - Function (e.g. switching lighting circuit DB03-L1)
 - A schedule of all installed cables, with the following information:
 - Circuit number (DB name, circuit breaker e.g. DB01-CB08)
 - Size
 - Installed length; and
 - Function (e.g. “Feeding Submersible pump IW-SP-01”)
 - Description and details w.r.t:
 - Detailed description of the function of all operator controls
 - Procedures for fault finding
 - Maintenance instructions for all components and including repair, overhaul, change-out and installation procedures
 - Inspection schedules; and
 - Spare part information and recommended spares

C3.3.4.2.5.5 E100.5.5 TESTING AND COMMISSIONING

a) General

- The installation shall be inspected and tested in accordance with SANS 10142-1.
- Inspection and testing shall only be performed by personnel with approved, current qualifications. The Contractor shall provide qualified personnel for the supervision for all inspection and testing activities.
- The Contractor shall provide all necessary safety equipment and test instruments. All test instruments shall comply with SANS 61010 and be covered by a current test and calibration certificate.
- The Contractor’s safe working arrangements shall comply with the safety management systems and procedures prevailing on site. Where there may be a risk of injury to personnel, the Contractor shall submit a risk assessment and method statement for approval, prior to starting work.
- Unless otherwise specified in the Particular Specification, all inspection and test results shall be recorded using pro-forma documentation (test certificates and schedules) complying with SANS 10142-1.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- The Contractor shall make provision for all inspection and testing activities to be witnessed. Unless otherwise specified in the Particular Specification, the period of notice for witness testing shall be 5 working days.
- Where most of the inspection and testing activities are not witnessed, the Contractor shall allow for 10% of the inspection and testing activities to be repeated for witness testing.
- If there is a requirement for additional inspection and test activities to be performed as part of process commissioning, this shall be specified in the Particular Specification.
- Unless otherwise agreed by the Employer, no part of the installation shall be commissioned until all defects or omissions revealed by inspection and testing have been rectified. Where a defect or omission renders all or part of the installation unsafe for use, the Contractor shall take approved precautions to ensure that no part of the installation can be commissioned.

b) Test Sequence

- Inspections before Testing
 - Before testing, inspections shall be performed to verify:
 - All equipment and material is of the correct type and complies with applicable SANS and IEC standards
 - All parts of the installation are correctly selected and erected
 - No part of the installation is visibly damaged or otherwise defective
 - The installation is suitable for the environmental conditions; and
 - The installation complies with this Specification
- Testing of Installation
- On satisfactory completion of the inspections specified in 5.2.1, the following tests shall be undertaken in the sequence listed as per SANS 10142-1:
 - Continuity of conductors
 - Resistance of earthing conductor
 - Continuity of ring circuits earth fault loop impedance at main switch
 - Elevated voltage on supply neutral earth resistance
 - Insulation resistance
 - Voltage, main distribution board - no load
 - Voltage, main distribution board - on load
 - Voltage at available load
 - Operation of earth leakage units
 - Earth leakage test button
 - Polarity at points of consumption

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
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- Switching devices

C3.3.4.2.6 E100.6 LOW VOLTAGE SWITCHGEAR AND CONTROL GEAR ASSEMBLIES

C3.3.4.2.6.1 E100.6.1 SCOPE

a) Application

- This document specifies the standard requirements for the design, installation, testing and commissioning of electrical installations operating on voltages up to 1 000 Volts AC / 1 500 Volts DC.
- The primary intention of this specification is to ensure the provision of an electrical installation, which has been designed and constructed to ensure safe, reliable, operation and to facilitate safe inspection, testing and maintenance.
- Note however that this specification only covers such installations (or sections of installations) that are covered by SANS 10142-1. Note also that certain provisions of this specification are inappropriate for direct application to installations where additional measures (such as earthing, intrinsic safe equipment, etc.) are required by SANS 10142-1 and SANS 10108 (i.e. medical and hazardous locations). For these types of installations, thorough reference must be made to the relevant statutory documentation.

b) Electrical System Characteristics

- The design of the installation shall comply with SANS 10142-1.
- The design of the installation shall consider the following supply characteristics:
 - Voltage, frequency and number of phases
 - Maximum prospective short circuit current (phase to phase and phase to neutral)
 - Type of system, e.g. TN-S, TN-C-S
 - Maximum earth loop impedance of the earth fault path external to the installation
 - Type and rating of the cut-out or switch device
 - Load capability of the supply source, particularly the effects on the supply voltage of the starting of new equipment and any fault contributions from new equipment
- The installation protective devices shall be correctly co-ordinated within the installation and with respect to existing installations. Discrimination studies shall be performed to validate the co-ordination of the installation.
- All equipment which requires operation or attendance by a person, or requires cleaning or maintenance in service, shall be constructed and installed to allow adequate and safe means of access and working space for such activities. Similarly, the positioning of equipment shall not impede access to, or working space at, non-electrical equipment and services for operation and maintenance activities.
- The installation shall be suitable for access and use by electrically unskilled persons.
- Where additions or alterations to an existing installation are to be performed, the rating and condition of existing equipment, including that associated with the supply, shall be verified to confirm its suitability to carry any additional load. The earthing and equipotential bonding

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



arrangements shall also be verified. No addition or alteration shall have an adverse effect on the existing installation.

C3.3.4.2.6.2 E100.6.2 STANDARDS

- Associated Documentation
 - This Specification identifies the Employer's standard modifications and requirements which shall be applied to the statutory and recognized standards. The detailed specification of the project or site-specific requirements will be found in the Particular Specification and its accompanying Technical Data Sheets, which shall be read in conjunction with this Specification.
 - Any items not specifically detailed in this Specification, which are necessary to provide a safe and fully operational working system, shall be deemed to be included.
 - The Contractor shall operate an auditable quality assurance procedure covering the design, construction, inspection and testing of the installation.
- Regulations, Specifications and Standards
 - The design, construction, inspection and testing of the installation shall comply with all relevant Statutory Regulations and Directives including:
 - Occupational Health and Safety Act (Act 85 of 1993)
 - Construction Regulations 2003 issued in terms of Section 43 of the Act
 - Local Fire Regulations; and
 - Regulations and by-laws of the Local Supply Authority

and the latest editions (current at the time of Tender) of all relevant South African National Standards, as well as International Standards, including but not limited to:

Table 14 Section 6: Reference standards

Standard Number	Description
SANS 32	Internal and/or external protective coatings for steel tubes - Specification for hot dip galvanized coatings applied in automatic plants
SANS 97	Electric cables – Impregnated paper insulated metal-sheathed cables for rated voltages 3,3/3,3kV to 19/22kV (excluding pressure assisted cables)
SANS 121	Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods
SANS 156	Moulded-case circuit-breakers
SANS 164	Two-pole and earthing-pin plugs and socket outlets
SANS 475	Luminaires for interior lighting, street lighting and floodlighting - Performance requirements
SANS 767	Earth leakage protection unit
SANS 950	Unplasticized polyvinyl chloride rigid conduit and fittings for use in electrical installations
SANS 1063	Earth rods, couplers and connections
SANS 1085	Wall outlet boxes for the enclosure of electrical accessories
SANS 1088	Luminaire entries and spigots

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Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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Standard Number	Description
SANS 1091	National colour standards of Paint
SANS 1195	Busbars
SANS 1213	Mechanical cable glands
SANS 1239	Plugs, socket-outlets and couplers for industrial purposes
SANS 1266	Ballasts for discharge lamps (excluding tubular fluorescent lamps)
SANS 1411	Materials of insulated electric cables and flexible cords
SANS 1431	Weldable structural steels
SANS 1507	Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V)
SANS 1700	Fasteners
SANS 1777	Photoelectric control units for lighting
SANS 1783	Sawn softwood timber
SANS 1973	Low-voltage switchgear and control gear Assemblies
SANS 2001	Construction Works
SANS 10155	Accuracy in buildings
SANS 10199	The design and installation of earth electrodes
SANS 10225	The design and construction of lighting masts
SANS 10177	Fire testing of materials, components and elements used in buildings Part 2: Fire resistance test for building elements
SANS 10142-1	Wiring of Premises Part 1: Low Voltage Installations
SANS 10400	The application of the National Building Regulations
SANS 60269	Low-voltage fuses
SANS 60309	Plugs, socket-outlets and couplers for industrial purposes
SANS 60529	Degrees of protection provided by enclosures (IP Code)
SANS 60614-2	Conduits for electrical installations - Particular specification for conduits
SANS 60669	Switches for household and similar fixed-electrical installations
SANS 60947	Low-voltage switchgear and control gear
SANS 61000	Electromagnetic compatibility (EMC)
SANS 61010	Safety requirements for electrical equipment for measurement, control, and laboratory use
SANS 61048	Auxiliaries for lamps - Capacitors for use in tubular fluorescent and other discharge lamp circuits - General and safety requirements
SANS 61238	Compression and mechanical connectors for power cables for rated voltages up to 30 kV (Um = 36 kV)
SANS 61643	Low-voltage surge protective devices
Other Standards	Description
ARP 035	Guidelines for the installation and maintenance of street lighting
BS 88	Specification of supplementary requirements for fuses of compact dimensions for use in 240 / 415 V industrial and commercial electric installations
IEC 157	Low voltage switchgear and control gear
IEC 408	Low voltage air-break switches, air-break disconnectors, air-break switch disconnectors and fuse combination units
IEC 12373	Aluminium and aluminium alloys. Anodizing. Method for specifying decorative and protective anodic oxidation coatings on aluminium
IEC 50086	Conduit systems for cable management

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



Standard Number	Description
IEC 60898	Specification for circuit-breakers for overcurrent protection for household and similar installations

- Standards are often tailored to the conditions of their country or origin (in terms of permissible voltages, expected ambient temperatures, etc.). Therefore, and unless normatively referenced to the contrary in a Standard of higher precedence, the decreasing order of precedence of Standards shall be:
 - South African National Standards (SANS, VC, etc.)
 - South African Sectoral Standards and Specifications (NERSA, CKS, ARP, NRS, PIESA, etc.)
 - ISO Standards
 - IEC Standards
 - Harmonized British Standards (BS EN)
 - Other Harmonized European National (EN) Standards (CEN, CENELEC, ETSI)
 - Non-Harmonized British Standards (BS)
 - Other international standards
- Where Standards of the same order are not in agreement with each other, the Standard with the most rigorous requirements shall apply.
- The installation shall also comply with:
 - This Specification, including all technical data sheets; and
 - Any documentation issued by, or on behalf of, the Employer in respect of the Installation.

C3.3.4.2.6.3 E100.6.3 COMPONENTS AND EQUIPMENT

a) General

- All equipment and components shall be suitable for their operating environment, particularly with respect to the following:
 - The degree of ingress protection against dust and moisture (IP rating)
 - The corrosion resistance of the materials of construction; and
 - Mechanical properties (especially impact strength)

b) Power Outlets

- Commercial Socket Outlets
 - All socket outlets with switches shall fully comply with SANS 164-0 and SANS 60669-1.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
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- Flush mounting units shall be suitable for a wall box of not less than 100 x 100 x 50 mm deep.
- Surface mounted patterns shall be housed in heavy pressed steel boxes.
- Any socket outlet exposed to weather, condensation, dripping or splashing of water shall have a rating of at least IP44.
- All socket outlets with switches shall be continuously rated at 16A and shall be suitable for operation on a 250V, 50 Hz, AC system.
- All socket outlets shall have shutters included on the live and neutral socket holes.
- Cover plates shall have bevelled edges which overlap the box.
- Socket outlets and their cover plates must adhere to the following colour and earth pin convention:
 - SANS 164-1, white (conventional system), 16A, 2-pin with round earth pin shall be protected by an earth leakage sensing device.
 - SANS 164-2, white (IEC system), 16A, 2-pin with round earth pin shall be protected by an earth leakage sensing device.
 - SANS 164-3, white (conventional system), 6A, 2-pin with round earth pin, shall only be used for connecting luminaires. The use thereof is not covered by this part of the specification.
 - SANS 164-4, red (dedicated system), 16A, 2-pin with 0° shaven earth pin is not protected by an earth leakage sensing device. This socket outlet would generally be connected to a dedicated supply system (this outlet shall be referred to as "red dedicated").
 - SANS 164-4, black (dedicated system), 16A, 2-pin with -53° shaven earth pin is not protected by an earth leakage sensing device. This socket outlet would generally be connected to a dedicated supply system (this outlet shall be referred to as "black dedicated").
 - SANS 164-4, blue (dedicated system), 16A, 2-pin with +53° shaven earth pin is not protected by an earth leakage sensing device. This socket outlet would generally be connected to a dedicated supply system (this outlet shall be referred to as "blue dedicated").
 - SANS 164-6, white (two-pole system for connection of class II equipment), 16A, 2-pin, un-earthed (the earthed version of this socket outlet is illegal in South Africa and may not be used). The contractor shall only install this socket outlet under specific instruction of the engineer (this outlet is also referred to as a "Schuko" socket outlet).
 - BS1363-2, 13A, rectangular 3-pin, British type socket outlet shall not be used.
- Industrial Socket Outlets
 - Plugs, couplers and socket outlets shall conform to the requirements of SANS 1239.
 - Where pilot connections are required, they shall disconnect before the main phase connectors disconnect.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- 3-Phase Socket Outlets
 - 400V socket outlets shall be five poled (three phases, one neutral and one earth), incorporating isolation mechanically interlocked with the plug.
 - The equipment enclosures shall be at least IP 55 to SANS 60529.
 - All welding plugs and socket outlets shall be 5 poled (3-phase, plus neutral, plus earth).
- Single Phase Outlets
 - 16 A, 250 V socket outlets shall be two pole and earth, incorporating isolation mechanically interlocked with the plug.
- Local Isolators (Switch-disconnectors)
 - Local isolators shall be selected from the following:
 - Isolator in accordance with SANS 60947-3, complete with additional late-make, early-break auxiliary contacts as required
 - Plug and socket assembly to SANS 60309-1 and SANS 60309-2, incorporating isolation mechanically interlocked with the plug; or
 - Plug and socket assembly to SANS 60309-1 incorporating a de-contactor arrangement or additional late-make early-break auxiliary contacts.
- Local isolators exposed to the weather, condensation, dripping or splashing of water shall have a rating of at least IP44.

C3.3.4.2.6.4 E100.6.4 INSTALLATION OF COMPONENTS AND EQUIPMENT

a) General

- Final positions of equipment shall be agreed with the Engineer on site, prior to installation.
- All equipment shall be securely mounted using propriety (i.e. suited to and manufactured for such use) fixtures and fittings.
- The method of equipment installation shall not adversely affect the function or structural integrity of the structure to which the equipment is attached.
- Equipment terminals and covers shall be readily and safely accessible after installation.
- The method of equipment installation shall not adversely affect the IP rating of the equipment.
- No horizontal chasing shall be allowed into brick or concrete work.
- It is the Contractor's responsibility to work closely together with the relevant parties responsible for the civil construction work to establish coordination in the installation program of components and conduits, as well as to establish a neat installation showing no indication of 'last minute changes'. Modification to existing structures shall be approved by the Engineer.
- Framework and Brackets
 - Site-fabricated framework and brackets shall not be used.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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- Framework and brackets shall be positioned so as not to adversely affect the removal and replacement of equipment.
- Where it is necessary to modify on site any pre-fabricated galvanized mild steel framework, the cut edges shall be dressed and treated immediately with an approved cold-galvanizing paint to prevent corrosion.

— Fasteners

- Fasteners securing equipment to framework and brackets shall be independent of those securing framework and brackets to walls and floors.
- No electroplated fasteners will be allowed. Only hot dipped galvanized or stainless steel fasteners will be allowed.
- Positioning of Equipment
- Equipment shall be positioned with due regard to the aesthetics of the installation.
- Equipment (e.g. outlets, switches, distribution boards, etc.) shall be installed plumb. If an imaginary line is drawn from the vertical side of any such component, the deviation of such imaginary line from the vertical shall not exceed ± 5 mm for every 1 m increase in height, with a maximum deviation from the vertical of ± 10 mm.
- The permissible deviation from the mounting heights indicated for equipment covered by this document shall be ± 10 mm, with a maximum of ± 5 mm deviation from the horizontal between adjacent outlets, isolators, luminaires, assemblies and / or switches.
- Where a group comprises a number of items at different mounting heights, with not more than one item at any one height, then all items shall be sited on a common vertical centre line.
- Where a group comprises a number of items mounted at the same height, then all items shall be sited on a common horizontal centre line.
- Where a group comprises a number of different sized items, they shall be arranged with the largest item at one end of the group and a progressive reduction in size of the remaining items.
- Where a group comprises a number of items at different mounting heights with more than one item at any height, then a common vertical centre line shall be established and the items arranged on, or symmetrically about, this centre line.
- Where a group comprises a number of items at the same mounting height with more than one item at the same position, then a common horizontal centre line shall be established and the items arranged on, or symmetrically about, this centre line.

— Mounting Height of Components

- Mounting heights shall be as follows unless otherwise specified:

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

**Table 15: Mounting height of components**

Distribution boards	Top frame 2000 mm above finished floor level, except where the board may be accessible to infants, where then the bottom frame shall be 1200 mm above finished floor level
Switches	All security controls and light switches shall be horizontally aligned with door handles and other fixtures and fittings (other than socket outlets) between 900 mm and 1,2 m above the finished floor level
Socket outlets	See 4.2
Telephone outlets	See 4.3

- All indoor switches and socket outlets shall be of the flush mounted type.

b) Installation of Socket Outlets

– General

- The Contractor should only start installation of power outlets in the conduit outlets after plasterers and painters have completed their work in the vicinity of the outlet.
- Socket outlets shall be installed at the following heights above finished floor level, measured to the underside of the outlet, unless otherwise specified:
 - 300 mm above finished floor level for general applications
 - 500 mm above fixed ground level where they are to be installed outside buildings
 - 1200 mm above finished floor level in kitchens
 - 300 mm above counter tops

– Connections to geysers

- Each geyser shall be connected to a separate circuit with a separate earth conductor.
- The conduit from the distribution board shall terminate in a 100 x 100 x 50 mm outlet box within 1 metre of the geyser. A suitably rated double pole isolator shall be installed in the outlet box. A flexible length of conduit shall be installed between the isolator and the geyser.

– Connections to heaters, fans, air conditioners and hand blowers

- A suitably rated double pole isolator shall be supplied and installed within 1 metre of heaters, fans and air conditioners. Where the equipment is out of reach the isolator, which must then be of the type capable of being locked in the open position, shall be installed 1.5 m above floor level, and a sign indicating location of the isolator shall be fixed onto or next to the equipment that it switches. Flexible cords may be used for the final connection to the equipment, provided the cables are correctly current rated.
- Where control units (for HVAC, BMS, etc.) are to be installed, the units shall be installed 1.5 m above the finished floor level.

c) Installation of Telecommunication Services and Accessories

– Telephone distribution boards

- Telephone distribution boards are to be installed with their bottom frames 1 200 mm above finished floor level.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- All conduits and sleeves to telephone outlets or telephone sub-distribution boards in the buildings or elsewhere on the site, as well as the main incoming sleeves, shall terminate at the main telephone distribution board, as shown on the relevant drawing.

– Separation of services

- Wireways provided for telecommunication or other related services shall under no circumstances be used for any other purpose.
- Power cables, conductors and accessories shall be installed at a minimum distance of 300 mm away from the routes reserved for telecommunication cables.
- Conduits and other channels shall be installed in such a way as to avoid telecommunication cables from crossing power cables.

d) Telecommunication outlets

- Telephone and / or data outlets in walls shall comprise of 100 x 100 x 50 mm deep wall boxes which shall be flush mounted in the wall, in the position shown on the relevant drawing, with the underside fixed 300 mm above the finished floor level, unless otherwise specified. The wall box shall be fitted with a white coloured blank cover plate.
- All outlet boxes shall align neatly with adjacent socket outlet wall boxes.
- Outlets in floors fitted with floor ducting shall be of the same type as the floor outlets for power socket outlets and shall be provided in the same outlet box.
- Outlets in power skirting shall be provided at the positions indicated on the relevant drawing, and the Contractor need only provide a separate short length power skirting cover at these positions. The cover for the fixing of outlet shall not exceed 250 mm in length and shall be secured in such a manner that adjacent cover plate sections can be removed without disturbing the telephone outlet.

C3.3.4.2.6.5 E100.6.5

WIREWAYS

a) Conduit

- Plain-end metallic conduit and accessories
 - Plain-end conduit shall be manufactured from mild steel having a minimum wall thickness of 0.9 mm and shall comply with SANS 60614.
 - Galvanised conduits shall be hot-dipped on both the internal and external surfaces, in accordance with SANS 121.
 - Epoxy powder-coated metal conduit may not be used in installations where bending of conduit will be required (unless prior approval of use has been granted by the Engineer).
 - Bending and setting of plain-end conduit shall be undertaken using the correct bending apparatus as recommended by the manufacturer of the conduit. After the bending of galvanized conduit, cold galvanizing paint shall be applied.
- PVC conduit and accessories
 - PVC conduit shall comply with SANS 950 and shall bear the SABS mark.
 - PVC conduit shall be constructed from rigid PVC. PVC conduit shall be white in colour and shall be non-flammable. The minimum softening temperature shall be 75°C.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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- All PVC conduit accessories shall be fully in accordance with SANS 950 and shall bear the SABS mark.
- Flexible conduit
 - Flexible steel conduit and adaptors shall comply with IEC 50086 where applicable.
 - Flexible steel conduit shall be of a galvanised steel construction. It does not need to be waterproof but shall be vermin proof and suitable for protection of cables against mechanical damage.
 - In moist or damp areas, flexible steel conduit shall be of the plastic sheathed galvanised steel type.
 - Flexible polypropylene tubing shall only be fastened to PVC conduit installations.
- Conduit Accessories
 - Earth clamps
 - Earth clamps shall comprise of copper strips having a minimum thickness of 1 mm and shall not be less than 12 mm wide. Earth clamps shall be provided complete with a 25 mm x 4 mm brass bolt, washer and nut and shall be constructed such that the clip can be firmly attached to the conduit without the need for any additional packing.
 - Flush mounted wall boxes
 - Flush mounted PVC wall boxes shall be manufactured from rigid PVC and shall be white in colour. All PVC wall boxes shall comply with SANS 950. "Open-back" type wall boxes will not be accepted.
 - Flush mounted steel wall boxes shall be manufactured from heavy gauge sheet steel and shall be galvanised. All steel wall boxes shall comply with SANS 1085.
 - The boxes shall be provided with the necessary mounting lugs to suit the units for which the box is intended and be provided with 20 mm knock-outs.
 - Facilities shall be provided for the fixing of earth terminals to the box.
 - Round group-type circular boxes
 - Steel round boxes shall be manufactured in accordance with SANS 1065 and shall be of the long spout pattern, constructed from either store enamelled jet black or galvanised steel, or from malleable cast iron.
 - PVC round boxes shall be manufactured in accordance with SANS 950 and of the same dimensions but having web-reinforced spouts.
 - The two cover fixing holes of both steel and PVC boxes shall be diagonally opposite each other and shall be drilled and tapped at 50 mm centres. Internal dimensions shall be approximately 60 mm in diameter by 60 mm deep for use in concrete work. Shallower boxes shall be used in open roof spaces.
 - The cover screw pillars shall be provided with tapped brass inserts and provision shall be made for a brass earthing terminal adjacent to one or both of the pillars.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- PVC round box covers shall be of PVC and shall be secured by means of brass screws at 50 mm centres.
- Draw wires
 - Draw wires for unused conduits shall either be galvanised steel wire or nylon, but shall have a minimum diameter of 2 mm.
- Conduit Installation
 - General
 - The conduit installation shall comply with par. 6.5 of SANS 10142-1.
 - Where the conduit installation is surface mounted, space-bar saddles must be used in order to provide an air gap between the conduit and mounting surface.
 - The conduit system shall be mechanically continuous, secure and shall be able to be re-wired.
 - All unused, screwed entries shall be fitted with a blanking plug. Female PVC bushes shall be fitted to all free ends.
 - Conduits shall not be used to support the weight of fittings etc., except where specifically designed to do so. Conduit boxes supporting luminaires or accessory boxes shall be fixed to the fabric of the building independently of the conduit.
 - Sufficient conduit and drawing boxes shall be provided to facilitate cable installation and removal. In general, no more than 2 bends or off-sets or one coupling shall be permitted without a conduit box.
 - Steel conduit shall not be relied upon for earth continuity
 - All PVC conduits shall be installed in accordance with Appendix C, SANS 950.
 - Draw boxes should be as far as possible be placed out of sight and shall be indicated on the "as built" drawings.
 - The edge of flush mounted outlet boxes shall not be deeper than 10 mm from the final surface. Where necessary, spacer springs shall be used under screws.
 - Oversize cover plates shall be provided on all flush mounted round conduit boxes, where required. Surface mounted boxes shall be provided with standard size cover plates.
- Flexible conduit
 - In installations where the equipment has to be moved frequently to enable adjustment during normal operation, for the connection of motors or any other vibrating equipment, for the connection of thermostats and sensors on equipment, for stove connection and where otherwise required, flexible conduit shall be used for the final connection to the equipment.
 - Flexible conduit shall be connected to the remainder of the installation by means of a draw box. The flexible conduit may be connected directly to the end of a conduit if an existing draw box is available within 2 m of the junction and if the flexible conduit can easily be rewired.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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- Flexible conduit shall consist of metal reinforced plastic conduit or PVC covered metal conduit with an internal diameter of at least 15 mm, unless approved to the contrary. In false ceiling voids, flexible conduit of galvanized steel construction may be used. Connectors for coupling to the flexible conduit shall be of the gland or screw-in type, manufactured from either brass or mild steel plated with zinc or cadmium.
- Installation in concrete
- In order not to delay building operations, the electrical Contractor shall ensure that all conduits and accessories which are to be cast in concrete are placed in position in good time. The Contractor or his representative shall be in attendance when the concrete is cast.
 - Draw boxes, expansion joints and round ceiling boxes shall be installed where required and shall be neatly finished to match the finished slab and wall surfaces. Ceiling draw boxes shall be of the deep recessed type. In columns where flush mounted draw boxes are installed, the conduits shall be offset from the surface of the column immediately after leaving the draw box.
 - Sharp bends and elbows for conduits of 32 mm diameter will not be allowed in concrete slabs.
 - Draw boxes and/or inspection boxes shall, where possible, be grouped together under a common approved cover plate. The cover plate shall be secured by means of brass screws.
 - All conduits shall be installed as close as possible to the neutral axis of concrete beams, slabs and columns. The conduits shall be rigidly secured to the reinforcing to prevent movement towards the surface of the concrete.
 - All conduits, draw boxes, etc., shall be securely fixed to the shuttering to prevent displacement when concrete is cast. Draw boxes and outlet boxes shall preferably be secured by means of a bolt and nut installed from the back of the box through the shuttering. Fixing lugs may also be used to screw the boxes to the shuttering where off-shutter finishes are required. Where fibre glass shuttering is used by the builder, the equipment shall be fixed to the steel only and no holes shall be drilled or made in shuttering. All draw boxes and outlet boxes shall be plugged with wet paper before they are secured to the shuttering.
 - As far as possible, conduits shall not be installed across expansion joints. Where this is unavoidable a conduit expansion joint shall be provided. The expansion joint shall consist of two draw boxes with an interlinking flexible conduit connection. The draw box shall be installed adjacent to the expansion joint of the structure and a conduit sleeve, one size larger than that specified for the circuit, shall be provided on the side of the draw box nearest to the joint. The one end of the sleeve shall terminate at the edge of the joint and the other shall be secured to the draw box. The circuit conduit passing through the sleeve shall be terminated 40 mm inside the draw box, and, in the case of metallic conduit, the conduit end shall be fitted with a brass bush. The gap between the sleeve and the conduit at the joint shall be sealed with TiC-TaC (Titanium Carbide / Tantalum Carbide) or equal sealing compound, to prevent the ingress of wet cement. The other end of the circuit conduit shall be secured to the draw box by means of a standard bushed adaptor for other PVC types. The cover plates shall be installed before the ceiling is painted. Where a number of conduits are installed in parallel, they shall cross the expansion joint of the structure via a single draw box. A number of draw boxes adjacent to each other will not be allowed.
 - The installation of conduits in floor screed shall be kept to a minimum. Where conduits are installed in screed, the top of the conduit shall be at least 20 mm below the surface of the screed. Where the screed is laid directly on the ground, galvanized conduits shall

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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be used. A minimum distance of twice the outside diameter of the conduit shall be left free between adjoining conduits. Conduits shall be secured to the concrete slab at intervals not exceeding 2,0 m. The Contractor shall ensure that conduits are not visible above the screed where the conduits leave the screed.

- All draw boxes, conduits, etc., which are installed in concrete shall be cleaned with compressed air and provided with draw wires two days after removal of the shuttering. Errors that occurred during the installation of the conduits, or any lost draw boxes or blocked conduits shall be reported to the Engineer immediately.
 - Where it is necessary to cut or drill holes in the concrete structure, prior permission shall be obtained from the Engineer in writing.
- Installation in brickwork
- Recessed conduits and accessories installed in brickwork shall be built-in. In order not to delay building operations the Contractor shall ensure that all conduits and accessories which are to be built-in are placed in position in good time.
 - Any conduit draw boxes, outlet boxes, etc., which have been damaged, lost or omitted, shall immediately be reported to the Engineer.
- Surface and roof space installations
- All conduits shall be installed horizontally or vertically as determined by the route. The electrical Contractor shall take all measures to ensure a neat installation.
 - Conduits shall be firmly secured by means of saddles and screws and in accordance with SANS 10142, par. 5.4.2(b). Conduits shall be secured within 150 mm before and after each 90° bend.
 - Only approved plugging materials, such as fibre plugs or plastic plugs, etc., and round head screws shall be used when fixing saddles, switches, plugs etc., to walls. Wood plugs are not acceptable, nor should plugs be installed in joints in brick walls.
- Chasing and builder's work
- Except where the project involves upgrading existing facilities, all flush mounted conduits, accessories, switchboard trays, bonding trays etc., shall be built-in and no chasing shall be allowed.
- Installation of Cables in Conduit
- The cable installation in the conduit shall conform to par. 6.5.6 of SANS 10142-1 and other portions of SANS, where applicable.
 - Conduit shall be deburred and swabbed prior to cables being pulled in.
 - Cables of other classifications and purpose (e.g. DC, Fire Detection, Audio, etc.) shall be installed in separate conduits.
 - Circuits supplied from different distribution boards shall not be installed in the same conduit.
 - Final sub-circuits shall not be installed in the same conduit as sub-mains circuits.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



b) Power Skirting

— Construction

- Power skirting must comply with all relevant parts of SANS 61084.
- Except where room dimensions dictates shortening thereof, in which case only one length per wall may be trimmed, power skirting and covers shall be installed in their standard (manufactured) lengths.
- The covers shall either snap on or shall be fixed by means of toggle or swivel nuts.
- Only socket outlets that are compatible for use with the particular type of power skirting may be used.
- Propriety internal and external bends, and off-sets of the same manufacture and product range, shall be used.
- Over and above the requirements of SANS 10142-1, all conductive power skirting that will contain telecommunication and / or control wiring shall be bonded in accordance with NRS 083-2 (details bonding methods that provide enhanced protection against the effects of electromagnetic cross-interference).

— Installation

- The bottom of the power skirting shall be installed at finished floor level, unless otherwise specified.
- Conduits for the circuit wiring to the power skirting must terminate in flush conduit boxes behind the power skirting at the respective heights of the compartments for the telephone, power and other service compartments.
- Notwithstanding the requirement to provide adequate capacity for the installation of data and telecommunication cables, conduits installed to power skirting installations shall have a minimum of 50% spare capacity, to allow for future expansion
- The wiring shall pass through large diameter holes, suitably bushed, cut in the rear of the power skirting. Where metallic skirting is installed, the holes shall be provided with rubber grommets.
- Where power skirting is interrupted by doorways, bridging conduits shall be installed for each of the service compartments.
- To allow for the easy removal of plugs from outlets, in multi compartment installations the bottom compartment(s) shall be for telecommunication services and the top compartment(s) for power circuits.

c) Cable Trunking

— Construction

- Cable trunking shall comply with all relevant parts of SANS 61084.
- Trunking shall be manufactured from galvanized metal and shall be supplied complete with PVC covers. PVC trunking will not be accepted.
- Cable trunking and covers shall be installed in their standard (manufactured) lengths, except at the end of runs as dictated by room dimensions.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- The covers shall either snap on or shall be fixed by means of toggle or swivel nuts.
- Propriety internal and external bends, and off-sets of the same manufacture and product range, shall be used.

— Installation

- Horizontal trunking shall be suspended from the overhead structure, such as slab soffit or roof trusses/ purlins with hangers and suitable brackets, at distances not exceeding 1,2 m or as specified by the manufacturer. The hangers shall be galvanized threaded rods or galvanized steel cables, which shall be arranged to support the trunking rigidly in both directions. Where fixed to a concrete slab the hanger shall be fastened by a suitably sized expandable drop-in anchor, as specified by the supplier. Hangers fixed to an overhead steel roof structure, shall be fastened by supplier recommended standard catalogue products, designed for this purpose.
- All wiring exiting cable trunking into an adjacent trunking or electrical enclosure, shall pass through large diameter holes, suitably bushed or provided with grommets, with cut-outs at the rear of the trunking.
- Where innovative wiring enters/ exits cable trunking, it shall be provided with a neoprene compression gland.

d) Wiring inside wireways

— General

- All unarmoured conductors shall be installed in conduits, trunking or power skirting, and such conductors shall not be exposed to possible mechanical damage.
- Any debris and moisture inside of wireways shall be removed prior to the installation of conductors.
- In the event that lubrication of cables is required in order to facilitate their installation, the lubricant shall be suitable for use with the type of cable as well as the type of wireway. The Contractor shall take steps to ensure that only the minimum amount of lubrication is applied. Should any seepage of lubricants into building elements or fixtures occur, it shall be the responsibility of the Contractor to remove the oil and fix the damaged building elements or fixtures, regardless of whether he installed the wireways or not.

— Circuits

- The circuits for the installation are indicated on the relevant drawings. Where not indicated on the drawings, the maximum number of points to be connected to each type of circuit shall be:

Table 15: Circuits

Light points per circuit	=	8
Single socket outlets per circuit	=	4
Extraction fan, Air conditioner points per circuit	=	2
Stove points per circuit	=	1

- When determining the number of outlets per circuit, double socket outlets count as two single socket outlets.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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- In kitchens, the number of socket outlets per circuit shall be reduced to 2.
- For “maintained”-type emergency light fittings, two live wires shall be installed to the luminaire:
 - The normal, switchable, circuit
 - An unswitched circuit, for battery charging only
 - The two live wires shall originate from the same circuit breaker.
- For 20 mm or small diameter conduit only one circuit will be allowed, with the exception of the wiring from switch boards to fabricated sheet metal boxes located close to switchboards, in which case more than one circuit will be allowed. For larger conduit sizes the requirements of SANS 10142, par. 6.5.6, shall be met.
- Looping and joints
 - A loop-in wiring system, where conductors are looped from outlet to outlet, shall be employed. Joints in conductors shall be avoided as far as possible, but where it becomes unavoidable, joints will be accepted in conduits. Joints shall be soldered or shall alternatively consist of approved crimped ferruling, properly covered with propriety heat-shrink sleeves. The use of PVC insulation tape is not acceptable.
- Channelled light fittings such as fluorescent fittings, shall not be used as a wireway. A t-off type draw box (dia 60mm round box, dia 60mm looping box or 100 x 50 x 50 mm wall box) shall be installed at each fitting, for circuit wiring to the relevant light fitting looping in and out.
- Grouping of conductors
- In cases where the conductors of more than one circuit are installed in the same wireway, the conductors of each separate circuit, including the circuit earth continuity conductor, shall be grouped at intervals of at least one metre using plastic cable ties. The conductors of different circuits shall however remain separate in order to ensure that any given circuit may be withdrawn from the wireway. Conductors entering distribution boards or control boards shall be grouped and bound by means of plastic cable bands. The use of PVC insulation tape for grouping conductors will not be accepted.
- Pulling-through of conductors
- The Contractor shall take utmost care whilst pulling conductors through conduit to ensure that the conductors are not kinked, twisted or strained in any manner. Care shall furthermore be taken to ensure that conductors do not come into contact with materials or surfaces that may damage or otherwise adversely affect the insulation and durability of the conductor.
- Earth continuity conductors
 - Only stranded copper conductors, which shall be bare or PVC insulated (coloured green/yellow), shall be used as earth continuity conductors. Although it shall be terminated such that it can fulfil this function (except where inappropriate, as will be the case of single core cable installations), under no circumstances shall the armouring and/or shielding of cables be relied upon to provide protective earth continuity.
 - When earth continuity conductors are looped between the earth terminals of equipment, the looped conductor ends shall be twisted together and then crimp ferruled or soldered to ensure that continuity is maintained, even when the conductors are removed from any earth terminal.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Where bare copper earth wires are specified for circuits installed in power skirting and floor ducting, the Contractor shall provide a suitable length of PVC sleeve over the bare earth conductor where it passes behind or is connected to power outlets, to ensure that such an earth conductor does not come into contact with any live parts.
 - The earth pin of dedicated socket outlets will be provided with a green/ yellow earth continuity conductor, whereas the yoke of the dedicated socket outlet shall be provided with a separate bare earth continuity conductor.
- Wiring inside vertical wireways
- Conductors installed in vertical wireways shall be secured at intervals not exceeding 5 m to support the weight of the conductors. Approved clamps shall be supplied and installed in suitable draw-boxes for this purpose.
- Conductor sizes
- The following minimum conductor sizes shall be used:

Table 16: Conductor sizes

Circuit	Minimum Conductor (Size)	
	Phase (mm ²)	Earth (mm ²)
Lighting	2,5	2,5
Socket outlet	2,5	2,5
Stove	6	6
Bell	1,5	1,5
Clock	1,5	1,5
Air conditioner	4	2,5
Control Wiring	1,5	1,5

- Single pole switches
- Single pole switches shall only be connected to the phase conductor (the neutral conductor shall NOT be switched by a single pole switch).
- Three phase outlets
- With the exception of three phase outlets, wiring to circuits connected to different phases shall not normally be present at lighting, switch or socket outlet boxes. Where this is unavoidable, barriers shall be provided between terminals or connections of the various phases and the box shall be suitably labelled internally to indicate the presence of line voltages.
 - A separate neutral conductor shall be installed together with each three phase circuit to outlets intended for equipment connection by means of isolators or socket outlets, irrespective of whether the particular equipment may require a neutral or not.

C3.3.4.2.6.6 E100.6.6 DRAWINGS AND DOCUMENTATION

a) General

- All drawings, information, and documentation shall be in English, and each item shall be identified with:

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- The Client's name and contact details
 - Client's project / scheme / contract reference title and numbers
 - The Engineer's name and contact details
 - Engineers reference numbers
 - Contractor's works / contract / order references.
- Drawings for acceptance shall be provided on A4 or A3 paper copies as specified.

b) Drawings for Approval

- The following documentation and drawings shall be submitted to the Engineer prior to the installation of cables and wireways and before civil construction have started on the areas where cable routes are required:
- Cable route layout drawings showing
 - Type of wireways
 - Trenching
 - Cable junction boxes

c) As-built Drawings

- Detailed "as-built" drawings, clearly labelled as such, and consisting of 3 sets of drawings printed to their original size, and, where the original drawings were larger than A3, 3 sets of drawings printed (with reduced scaling, but without omitting any information from the printed area), to A3, shall be provided by the Contractor, indicating positions of the following:
- Equipment (e.g. light fittings, draw boxes, outlets etc.)
 - Wireways (e.g. trenches, conduit, cables ladder/trays, power skirting etc.); and
 - Cable routes (including any cable joints)
 - General arrangement drawings
 - Single Line Diagrams

d) Operating and Maintenance Manual

- Three Operation Manuals, three Maintenance Manuals and three Certification copies shall be provided for all equipment supplied. The manuals shall be in A4 format.
- The operating and maintenance manuals shall include at least the following:
- A schedule of installed components and equipment, containing the following information:
 - Manufacturers name and contact details
 - Circuit number (DB name, circuit breaker e.g. DB01-CB08); and

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
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- Function (e.g. switching lighting circuit DB03-L1)
- A schedule of all installed cables, with the following information:
 - Circuit number (DB name, circuit breaker e.g. DB01-CB08)
 - Size
 - Installed length; and
 - Function (e.g. "Feeding Submersible pump IW-SP-01")
- Description and details w.r.t:
 - Detailed description of the function of all operator controls
 - Procedures for fault finding
 - Maintenance instructions for all components and including repair, overhaul, change-out and installation procedures
 - Inspection schedules; and
 - Spare part information and recommended spares.

C3.3.4.2.6.7 E100.6.7 TESTING AND COMMISSIONING

a) General

- The installation shall be inspected and tested in accordance with SANS 10142-1.
- Inspection and testing shall only be performed by personnel with approved, current qualifications. The Contractor shall provide qualified personnel for the supervision for all inspection and testing activities.
- The Contractor shall provide all necessary safety equipment and test instruments. All test instruments shall comply with SANS 61010 and be covered by a current test and calibration certificate.
- The Contractor's safe working arrangements shall comply with the safety management systems and procedures prevailing on site. Where there may be a risk of injury to personnel, the Contractor shall submit a risk assessment and method statement for approval, prior to starting work.
- Unless otherwise specified in the Particular Specification, all inspection and test results shall be recorded using pro-forma documentation (test certificates and schedules) complying with SANS 10142-1.
- The Contractor shall make provision for all inspection and testing activities to be witnessed. Unless otherwise specified in the Particular Specification, the period of notice for witness testing shall be 5 working days.
- Where most of the inspection and testing activities are not witnessed, the Contractor shall allow for 10% of the inspection and testing activities to be repeated for witness testing.
- If there is a requirement for additional inspection and test activities to be performed as part of process commissioning, this shall be specified in the Particular Specification.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
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- Unless otherwise agreed by the Employer, no part of the installation shall be commissioned until all defects or omissions revealed by inspection and testing have been rectified. Where a defect or omission renders all or part of the installation unsafe for use, the Contractor shall take approved precautions to ensure that no part of the installation can be commissioned.

b) Test Sequence

- Inspections before Testing
 - Before testing, inspections shall be performed to verify:
 - All equipment and material is of the correct type and complies with applicable SANS and IEC standards
 - All parts of the installation are correctly selected and erected
 - No part of the installation is visibly damaged or otherwise defective
 - The installation is suitable for the environmental conditions; and
 - The installation complies with this Specification
- Testing of Installation
- On satisfactory completion of the inspections specified in 5.2.1, the following tests shall be undertaken in the sequence listed as per SANS 10142-1:
 - Continuity of conductors
 - Resistance of earthing conductor
 - Continuity of ring circuits earth fault loop impedance at main switch
 - Elevated voltage on supply neutral earth resistance
 - Insulation resistance
 - Voltage, main distribution board - no load
 - Voltage, main distribution board - on load
 - Voltage at available load
 - Operation of earth leakage units
 - Earth leakage test button
 - Polarity at points of consumption
 - Switching devices

C3.3.4.2.7 E100.7 LIGHTING

C3.3.4.2.7.1 E100.7.1 SCOPE

a) Application

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- This document specifies the standard requirements for the design, installation, testing and commissioning of electrical installations operating on voltages up to 1 000 Volts AC / 1 500 Volts DC.
- The primary intention of this specification is to ensure the provision of an electrical installation, which has been designed and constructed to ensure safe, reliable, operation and to facilitate safe inspection, testing and maintenance.
- Note however that this specification only covers such installations (or sections of installations) that are covered by SANS 10142-1. Note also that certain provisions of this specification are inappropriate for direct application to installations where additional measures (such as earthing, intrinsic safe equipment, etc.) are required by SANS 10142-1 and SANS 10108 (i.e. medical and hazardous locations). For these types of installations, thorough reference must be made to the relevant statutory documentation.

b) Electrical System Characteristics

- The design of the installation shall comply with SANS 10142-1.
- The design of the installation shall consider the following supply characteristics:
 - Voltage, frequency and number of phases
 - Maximum prospective short circuit current (phase to phase and phase to neutral)
 - Type of system, e.g. TN-S, TN-C-S
 - Maximum earth loop impedance of the earth fault path external to the installation
 - Type and rating of the cut-out or switch device
 - Load capability of the supply source, particularly the effects on the supply voltage of the starting of new equipment and any fault contributions from new equipment
- The installation protective devices shall be correctly co-ordinated within the installation and with respect to existing installations. Discrimination studies shall be performed to validate the co-ordination of the installation.
- All equipment which requires operation or attendance by a person, or requires cleaning or maintenance in service, shall be constructed and installed to allow adequate and safe means of access and working space for such activities. Similarly, the positioning of equipment shall not impede access to, or working space at, non-electrical equipment and services for operation and maintenance activities.
- The installation shall be suitable for access and use by electrically unskilled persons.
- Where additions or alterations to an existing installation are to be performed, the rating and condition of existing equipment, including that associated with the supply, shall be verified to confirm its suitability to carry any additional load. The earthing and equipotential bonding arrangements shall also be verified. No addition or alteration shall have an adverse effect on the existing installation.

C3.3.4.2.7.2 E100.7.2 STANDARDS

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



a) Associated Documentation

- This Specification identifies the Employer's standard modifications and requirements which shall be applied to the statutory and recognized standards. The detailed specification of the project or site-specific requirements will be found in the Particular Specification and its accompanying Technical Data Sheets, which shall be read in conjunction with this Specification.
- Any items not specifically detailed in this Specification, which are necessary to provide a safe and fully operational working system, shall be deemed to be included.
- The Contractor shall operate an auditable quality assurance procedure covering the design, construction, inspection and testing of the installation.

b) Regulations, Specifications and Standards

- The design, construction, inspection and testing of the installation shall comply with all relevant Statutory Regulations and Directives including:
 - Occupational Health and Safety Act (Act 85 of 1993)
 - Construction Regulations 2003 issued in terms of Section 43 of the Act
 - Local Fire Regulations; and
 - Regulations and by-laws of the Local Supply Authority

and the latest editions (current at the time of Tender) of all relevant South African National Standards, as well as International Standards, including but not limited to:

Table 17 Section 7: Reference standards

Standard Number	Description
SANS 32	Internal and/or external protective coatings for steel tubes - Specification for hot dip galvanized coatings applied in automatic plants
SANS 97	Electric cables – Impregnated paper insulated metal-sheathed cables for rated voltages 3,3/3,3kV to 19/22kV (excluding pressure assisted cables)
SANS 121	Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods
SANS 156	Moulded-case circuit-breakers
SANS 164	Two-pole and earthing-pin plugs and socket outlets
SANS 475	Luminaires for interior lighting, street lighting and floodlighting - Performance requirements
SANS 767	Earth leakage protection unit
SANS 950	Unplasticized polyvinyl chloride rigid conduit and fittings for use in electrical installations
SANS 1063	Earth rods, couplers and connections
SANS 1085	Wall outlet boxes for the enclosure of electrical accessories
SANS 1088	Luminaire entries and spigots
SANS 1091	National colour standards of Paint
SANS 1195	Busbars
SANS 1213	Mechanical cable glands
SANS 1239	Plugs, socket-outlets and couplers for industrial purposes

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Standard Number	Description
SANS 1266	Ballasts for discharge lamps (excluding tubular fluorescent lamps)
SANS 1411	Materials of insulated electric cables and flexible cords
SANS 1431	Weldable structural steels
SANS 1507	Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V)
SANS 1700	Fasteners
SANS 1777	Photoelectric control units for lighting
SANS 1783	Sawn softwood timber
SANS 1973	Low-voltage switchgear and control gear Assemblies
SANS 2001	Construction Works
SANS 10155	Accuracy in buildings
SANS 10199	The design and installation of earth electrodes
SANS 10225	The design and construction of lighting masts
SANS 10177	Fire testing of materials, components and elements used in buildings Part 2: Fire resistance test for building elements
SANS 10142-1	Wiring of Premises Part 1: Low Voltage Installations
SANS 10400	The application of the National Building Regulations
SANS 60269	Low-voltage fuses
SANS 60309	Plugs, socket-outlets and couplers for industrial purposes
SANS 60529	Degrees of protection provided by enclosures (IP Code)
SANS 60614-2	Conduits for electrical installations - Particular specification for conduits
SANS 60669	Switches for household and similar fixed-electrical installations
SANS 60947	Low-voltage switchgear and control gear
SANS 61000	Electromagnetic compatibility (EMC)
SANS 61010	Safety requirements for electrical equipment for measurement, control, and laboratory use
SANS 61048	Auxiliaries for lamps - Capacitors for use in tubular fluorescent and other discharge lamp circuits - General and safety requirements
SANS 61238	Compression and mechanical connectors for power cables for rated voltages up to 30 kV (Um = 36 kV)
SANS 61643	Low-voltage surge protective devices
Other Standards	Description
ARP 035	Guidelines for the installation and maintenance of street lighting
BS 88	Specification of supplementary requirements for fuses of compact dimensions for use in 240 / 415 V industrial and commercial electric installations
IEC 157	Low voltage switchgear and control gear
IEC 408	Low voltage air-break switches, air-break disconnectors, air-break switch disconnectors and fuse combination units
IEC 12373	Aluminium and aluminium alloys. Anodizing. Method for specifying decorative and protective anodic oxidation coatings on aluminium
IEC 50086	Conduit systems for cable management
IEC 60898	Specification for circuit-breakers for overcurrent protection for household and similar installations

- Standards are often tailored to the conditions of their country or origin (in terms of permissible voltages, expected ambient temperatures, etc.). Therefore, and unless

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
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normatively referenced to the contrary in a Standard of higher precedence, the decreasing order of precedence of Standards shall be:

- South African National Standards (SANS, VC, etc.)
 - South African Sectoral Standards and Specifications (NERSA, CKS, ARP, NRS, PIESA, etc.)
 - ISO Standards
 - IEC Standards
 - Harmonized British Standards (BS EN)
 - Other Harmonized European National (EN) Standards (CEN, CENELEC, ETSI)
 - Non-Harmonized British Standards (BS)
 - Other international standards
- Where Standards of the same order are not in agreement with each other, the Standard with the most rigorous requirements shall apply.
- The installation shall also comply with:
- This Specification, including all technical data sheets; and
 - Any documentation issued by, or on behalf of, the Employer in respect of the Installation.

C3.3.4.2.7.3 E100.7.3 COMPONENTS AND EQUIPMENT

a) Luminaires, Control Gear and Lamps

Locally manufactured luminaires and associated accessories, control gear, lamps, test, etc. shall be comply with the latest editions (current at the time of Tender) of all relevant South African National Standards, as well as International Standards, including but not limited to:

Table 18: Reference Standards for luminaires, control gear and lamps

Standard Number	Description
SANS 215	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
SANS 890	Ballasts for fluorescent lamps
SANS 891	Reference ballasts for class B fluorescent lamps
SANS 1041	Tubular fluorescent lamps for general service
SANS 1266	Ballasts for discharge lamps (excluding tubular fluorescent lamps)
SANS 1464-22	Safety of luminaires- Part 22: Luminaires for emergency lighting
SANS 1662	Self-ballasted LED tubular lamps for general lighting services of > 50 V — Safety requirements
SANS 1664:	Semi-luminaires for T5 fluorescent lamps — Safety requirements
SATS 1706	UVGI luminaires — Safety and performance requirements
SANS 1814	D.C. supplied luminaires for fluorescent lamps
SANS 10114	Interior lighting
SANS 10389	Exterior lighting

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Witness:		Witness:	

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Standard Number	Description
SANS 17576	Light-emitting diode products for interior lighting, streetlighting and floodlighting - Performance requirement
SANS 50285	Energy efficiency of electric lamps for household use - Measurement methods
SANS 60064	Tungsten filament lamps for domestic and similar general lighting purposes - Performance requirements
SANS 60188	High-pressure mercury vapour lamps - Performance specifications
SANS 60192	Low-pressure sodium vapour lamps - Performance specifications
SANS 60079	Explosive atmospheres- Parts 14 and 17
SANS 60155	Glow-starters for fluorescent lamps
SANS 60238	Edison screw lamp holders
SANS 60399	Barrel thread for lamp holders with shade holder ring
SANS 60400	Lamp holders for tubular fluorescent lamps and starter holders
SANS 60432	Incandescent lamps- Parts 1 to 3
SANS 60570	Electrical supply track systems for luminaires
SANS 60598-1	Luminaires- Part 1: General requirements and tests
SANS 60662	High-pressure sodium vapour lamps
SANS 60598-2 to 25	Luminaires- Part 2-1 to Part 2-25
SANS 60730-2-3	Automatic electrical controls for household and similar use Part 2-3: Particular requirements for thermal protectors for ballasts for tubular fluorescent lamps
SANS 60838-1	Miscellaneous lamp holders Part 1: General requirements and tests
SANS 60901	Single-capped fluorescent lamps - Performance specifications
SANS 60921	Ballasts for tubular fluorescent lamps - Performance requirements
SANS 60923	Auxiliaries for lamps - Ballasts for discharge lamps (excluding tubular fluorescent lamps) - Performance requirements
SANS 60925	DC supplied electronic ballasts for tubular fluorescent lamps - Performance requirements
SANS 60927	Auxiliaries for lamps - Starting devices (other than glow starters) - Performance requirements
SANS 60929	AC and/or DC-supplied electronic control gear for tubular fluorescent lamps - Performance requirements
SANS 60968	Self-ballasted lamps for general lighting services - Safety requirements
SANS 60969	Self-ballasted lamps for general lighting services — Performance requirements
SANS 61047	DC or AC supplied electronic step-down convertors for filament lamps - Performance requirements
SANS 61048	Auxiliaries for lamps - Capacitors for use in tubular fluorescent and other discharge lamp circuits - General and safety requirements
SANS 61049	Capacitors for use in tubular fluorescent and other discharge lamp circuits - Performance requirements
SANS 61195	Double-capped fluorescent lamps - Safety specifications
SANS 61199	Single-capped fluorescent lamps - Safety specifications
SANS 61347	Lamp control gear
SANS 61547:	Equipment for general lighting purposes — EMC immunity requirements

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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Standard Number	Description
SANS 61549	Miscellaneous lamps
SANS 61195	Devices for the connection of luminaires for household and similar purposes- Parts 1 and 2
SANS 61231	International lamp coding system (ILCOS)
SANS 62031	LED modules for general lighting — Safety specifications
SANS 62034	Automatic test systems for battery powered emergency escape lighting
SANS 62035	Discharge lamps (excluding fluorescent lamps) - Safety specifications
SANS 62386	Digital addressable lighting interface- Parts 101 to 103 and Parts 201 to 210
SANS 62442	Energy performance of lamp control gear
SANS 62504	General lighting — Light emitting diode (LED)- products and related equipment — Terms and definitions
SANS 62532	Fluorescent induction lamps - Safety specifications
SANS 62560	Self-ballasted LED-lamps for general lighting services by voltage > 50 V - Safety specification
SANS 62612	Self-ballasted LED lamps for general lighting services with supply voltages > 50 V - Performance requirements
SANS 62733	Programmable components in electronic lamp control gear- General and safety requirement
SANS 62838	LEDs lamps for general lighting services with supply voltages not exceeding 50 V a.c. r.m.s. or 120 V ripple free d.c. - Safety specifications

— Luminaires

- Luminaires shall be delivered within 12 months from being manufactured and shall be delivered to site unused with protective wrappings.
- Luminaires shall be delivered, stored and handled in accordance with the manufacturer's instructions. Where the performance of the luminaire is likely to be adversely affected, all necessary preventative precautions shall be undertaken.
- Luminaires shall be protected against mechanical damage.
- Upon the Engineer's request, electronic photometric data files shall be made available for each luminaire. These files shall be suitable for lighting simulation software such as Relux and Dialux.
- Luminaires to be connected to 6A socket outlets, such as recessed luminaires, shall be provided with 3m long cords, complete with moulded 6A plug top (cord-set).
- If required by the Employer, a sample of every luminaire offered shall be submitted to the Employer for approval. Acceptance of the samples by the Employer shall not place the Employer under any obligation.
- The contractor shall forward SANS 60598 compliant type-test certificates of luminaires, to the Engineer upon request.
- All imported luminaires shall through the Letter of Authority Process by the NRCS adhere to the relevant SANS requirements, as set out by the Compulsory Specification VC 8055.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



– Control Gear and Enclosures

- High frequency, electronic control gear shall be used for tubular (double capped) and compact (single capped) fluorescent lamps, and, where appropriate, for discharge lamps. Electromagnetic control gear may not be used, unless no other alternative is available.

– Lamps

- All luminaires shall be supplied complete with lamps.
- All lamps of a specific type shall be of the same manufacturer.
- All fluorescent type discharge lamps shall be colour 840, unless otherwise specified.
- All metal halide lamps shall be “natural daylight” colour, unless otherwise specified.
- All LED’s shall have a colour temperature of 4000K, unless otherwise specified.
- A service call shall be done on all lamps, ten working days before expiry of the manufacturer’s guarantee period.

c) Switches

– Flush mounted switches

- Flush mounted switches shall comply with SANS 60669-1 and shall bear the SABS mark.
- All flush mounted switches shall be suitable for mounting in 100 x 50 x 50 mm galvanised steel or PVC wall boxes. “Open-back” type wall boxes will not be accepted.
- The switch mechanism shall be of the tumbler-operated micro-gap type with silent operation, and shall be rated for 16 A continuous loading at 50 Hz and 250 V.
- Switches shall have protected terminals for safe wiring. Multi-lever switches shall be constructed so as to enable individual defective switches to be removed and replaced without having to remove the remaining switches.
- The mounting holes provided on the yoke strap shall be slotted to allow for easy alignment. A brass earthing terminal shall furthermore be provided on the yoke to ensure the positive earthing of the switch assembly.
- Cover plates for flush mounted switches shall have levelled edges which overlap the wall box in order to conceal all wall imperfections.

– Surface mounted switches

- Surface mounted switches shall comply with SANS 60669-1 and shall bear the SABS mark.
- Surface mounted switches shall consist of single or multiple switches, not exceeding four, and shall be mounted in a pressed steel box of heavy duty construction.
- The switch mechanism shall be of the tumbler operated micro-gap type with silent operation and shall be rated for 16A continuous loading at 250V and 50Hz.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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- A brass earthing terminal shall furthermore be provided on the switch construction to ensure the positive earthing of the switch assembly and enclosure.
 - The covers of surface mounted switches shall have toggle protectors.
- Photo-Electric daylight switches
- The unit shall comprise a photo-cell, thermal actuator and change-over switch. The cover of the unit shall be manufactured from a tough, durable material providing protection against tampering. The cover shall have good weathering properties. It shall be ultraviolet resistant and shall not deteriorate when exposed to sunlight for prolonged periods.
 - The units shall be capable of operating in dusty conditions, and over an ambient temperature range - 15°C to + 55°C.
 - The units shall be designed to withstand damage by hail and stones thrown by vandals. If the units do not possess this quality, separate wire screens shall be provided for this purpose.
 - All parts shall be treated to be corrosion-proof.
 - The operation level shall be factory pre-set for "ON" at a light level of 60 lux and "OFF" at 90 lux, with a permissible deviation of 12 lux either way. Voltage variations shall not materially affect the operational levels.
 - A time delay, of not less than 15 seconds, shall be provided to prevent the unit from functioning due short-duration changes in illumination, such as lightning.
 - The unit shall be effectively safeguarded against voltage surges by means of a suitable surge protector, which shall preferably form an integral part of the unit.
 - The unit shall be of the wall mounting type and shall be supplied complete with a suitable bracket.
 - The change-over switch shall be capable of switching 10A AC at 250V.
 - The unit shall be mounted inside an IP65 enclosure. The enclosure shall have a transparent lid.
- Dimmer modules
- Dimmer modules shall comply with SANS 60929.
 - Units shall be rated at 250V, and capable of powering inductive (minimum power factor of 0.65 lagging) and capacitive (minimum power factor of 0.75 leading) loads.
 - The efficiency of modules may not be less than 95%, and the harmonic current injection not more than 1% THD, at full load (where such load is resistive).
 - Furthermore, the units shall be provided with automatic over-temperature, over-current and short-circuit cut-out features. Where over-current of short duration is expected (i.e. luminaire starting current), over-current protection may be by way of self-regulation (i.e. a reduction in output voltage).
 - Dimmer modules shall be sound-attenuated, such that audible noise is limited to 30dB (all weightings) measured at a distance of 1 m from the module.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- The output of modules shall be controlled by propriety pushbutton-type switches. An additional switch, located in the same enclosure as the pushbutton, shall be provided for switching the input to the dimmer module.
 - Unless prior approval in this regard has been gained from the Engineer, dimmer modules may not be paralleled.
 - Dimmer modules shall be selected and installed such that 30% spare capacity will be available for future additions to the output circuitry.
- Occupancy sensors
- Occupancy (also referred to as motion or vacancy sensors), shall be installed in accordance with the manufacturer's requirements and specification.
 - Sensors shall adhere to the latest amendment of IEC 62386-303: Digital addressable lighting interface - Part 303: Particular requirements – Input devices – Occupancy sensor.
 - Surface mounted sensors on ceilings, shall be screw fixed to a round box installed on the inside of the ceiling.
 - Where sensors are part of a surface mounted installed, such as against a soffit of a concrete slab, it shall be mounted on a 100 x 100 mm draw box fixed on a blanking plate.
 - Sensors shall be selected to carry the full load of the circuit, with 30% spare capacity for future expansion. When selecting the sensor, the high start-up current of some lamps as well as LED's, shall be taken into account.
 - Sensors shall be positioned optimally for its application. Cognisance shall be taken of the following:
 - The mode of occupancy of the relevant area
 - Sensing range
 - Position sensors away from air ducts and windows
 - Direction of motion
 - Any obstructions by future furniture/ equipment
 - When obstruction is problematic, sensors with infrared detection shall not be used. Technology such as active microwave or ultrasonic sensors shall be installed.
 - Sensors shall be adjusted optimally, as part of the testing and commissioning procedure. The following items shall be set:
 - Sensing range
 - Daylight harvesting lux adjustment
 - Delay time

C3.3.4.2.7.4 E100.7.4 INSTALLATION OF COMPONENTS AND EQUIPMENT

a) Installation of Lighting and Accessories

– Mounting of light fittings

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Surface mounted down light holders, such as the bayonet / screw-in type lamp holders used for incandescent fittings, shall be screwed to the ceiling by means of at least two 4 mm diameter self-tapping screws. Plastic expansion plugs, of good quality, are to be used where the surface is concrete, plaster or brick. For suspended and soft ceilings, a solid timber backing strip of at least 40 x 40 mm timber must be supplied and installed between supports, with the screws fixed to these backing strips.
- Channelled fittings, such as fluorescent fittings, shall be firmly mounted to ensure close contact with the ceiling over the entire length of the fitting. On concrete slabs the fittings shall be mounted by means of two screws into the ceiling conduit box, as well as two round-headed 6 mm x 40 mm electroplated self-tapping screws and plastic expansion plugs, one at either end. Where fittings are to be installed underneath suspended ceilings, they shall be mounted in an equal manner, but timber backing strips of at least 40 x 40 x 450 mm (at both ends) shall be placed in position on top of the ceiling board and the end screws secured to these strips, such that the weights of the fittings distribute evenly.
- Channelled light fittings fixed to P2000 type trunking, shall be fixed to the trunking by means of a "fluorescent adaptor" specifically designed for this purpose. Wiring to and from the light fitting shall pass through this adaptor.
- Channelled light fittings such as fluorescent fittings, shall not be used as a wireway. A t-off type draw box (dia 60mm round box, dia 60mm looping box or 100 x 50 x 50 mm wall box) shall be installed at each fitting, for circuit wiring to the relevant light fitting looping in and out.
- Flat-back type wall mounted light fittings (such as bulkhead light fittings) shall be fixed to walls by means of two round-headed 6 mm x 40 mm electroplated self-tapping screws and plastic expansion wall plugs. The light fitting shall be positioned with the rear entry facility for wiring directly over a diameter 60mm flush round box.
- Positions of recessed down lights shall be set out for the ceiling contractor to cut the openings for the lights. Manufacturers recommended cut-out sized shall be communicated to the ceiling contractor.
- Recessed fluorescent light fittings, for installation in suspended ceiling grids shall be properly installed and seated in the relevant openings. Recessed fluorescent light fittings shall not be obstructed by any building elements such as partition walls.
- To ensure the safety of people below, where fittings are clamped or bolted directly to trusses or other building elements (as in the case of some high bay and floodlight installations) they shall be provided with an additional safety chain or safety cable of appropriate corrosion-proof material. This safety cable / safety chain assembly shall be connected independently of the luminaire-supporting clamps or bolts, such that either assembly can be loosened and removed without affecting the other. The safety assemblies shall have a load safety factor not less than 3.
- In the case where control gear is not part of the luminaire, it shall be installed adjacent to the light fitting. The control gear shall be provided with the same cable / safety chain assembly, as mentioned in item h) above.
- Specialized light fittings (i.e. types of fittings not mentioned in this specification) must be installed strictly in accordance with their manufacturer's requirements and guidelines.

C3.3.4.2.7.5 E100.7.5 DRAWINGS AND DOCUMENTATION

a) General

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- All drawings, information, and documentation shall be in English, and each item shall be identified with:
 - i) The Client's name and contact details
 - ii) Client's project / scheme / contract reference title and numbers
 - iii) The Engineer's name and contact details
 - iv) Engineers reference numbers
 - v) Contractor's works / contract / order references.
 - Drawings for acceptance shall be provided on A4 or A3 paper copies as specified.
- b) Drawings for Approval
- The following documentation and drawings shall be submitted to the Engineer prior to the installation of cables and wireways and before civil construction have started on the areas where cable routes are required:
 - i) Cable route layout drawings showing:
 - Type of wireways
 - Trenching
 - Cable junction boxes
- c) As-built Drawings
- Detailed “as-built” drawings, clearly labelled as such, and consisting of 3 sets of drawings printed to their original size, and, where the original drawings were larger than A3, 3 sets of drawings printed (with reduced scaling, but without omitting any information from the printed area), to A3, shall be provided by the Contractor, indicating positions of the following:
 - i) Equipment (e.g. light fittings, draw boxes, outlets etc.)
 - ii) Wireways (e.g. trenches, conduit, cables ladder/trays, power skirting etc.); and
 - iii) Cable routes (including any cable joints)
 - iv) General arrangement drawings
 - v) Single Line Diagrams
- d) Operating and Maintenance Manual
- Three Operation Manuals, three Maintenance Manuals and three Certification copies shall be provided for all equipment supplied. The manuals shall be in A4 format.
 - The operating and maintenance manuals shall include at least the following:
 - i) A schedule of installed components and equipment, containing the following information:
 - ii) Manufacturers name and contact details
 - iii) Circuit number (DB name, circuit breaker e.g. DB01-CB08); and
 - iv) Function (e.g. switching lighting circuit DB03-L1)
 - b) A schedule of all installed cables, with the following information:
 - i) Circuit number (DB name, circuit breaker e.g. DB01-CB08)
 - ii) Size
 - iii) Installed length; and
 - iv) Function (e.g. “Feeding Submersible pump IW-SP-01”)
 - c) Description and details w.r.t:
 - i) Detailed description of the function of all operator controls
 - ii) Procedures for fault finding
 - iii) Maintenance instructions for all components and including repair, overhaul, change-out and installation procedures
 - iv) Inspection schedules; and
 - v) Spare part information and recommended spares

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



C3.3.4.2.6.7 E100.6.7 TESTING AND COMMISSIONING

a) General

- The installation shall be inspected and tested in accordance with SANS 10142-1.
- Inspection and testing shall only be performed by personnel with approved, current qualifications. The Contractor shall provide qualified personnel for the supervision for all inspection and testing activities.
- The Contractor shall provide all necessary safety equipment and test instruments. All test instruments shall comply with SANS 61010 and be covered by a current test and calibration certificate.
- The Contractor's safe working arrangements shall comply with the safety management systems and procedures prevailing on site. Where there may be a risk of injury to personnel, the Contractor shall submit a risk assessment and method statement for approval, prior to starting work.
- Unless otherwise specified in the Particular Specification, all inspection and test results shall be recorded using pro-forma documentation (test certificates and schedules) complying with SANS 10142-1.
- The Contractor shall make provision for all inspection and testing activities to be witnessed. Unless otherwise specified in the Particular Specification, the period of notice for witness testing shall be 5 working days.
- Where most of the inspection and testing activities are not witnessed, the Contractor shall allow for 10% of the inspection and testing activities to be repeated for witness testing.
- If there is a requirement for additional inspection and test activities to be performed as part of process commissioning, this shall be specified in the Particular Specification.
- Unless otherwise agreed by the Employer, no part of the installation shall be commissioned until all defects or omissions revealed by inspection and testing have been rectified. Where a defect or omission renders all or part of the installation unsafe for use, the Contractor shall take approved precautions to ensure that no part of the installation can be commissioned.

b) Test Sequence

- Inspections before Testing
 - Before testing, inspections shall be performed to verify:
 - All equipment and material is of the correct type and complies with applicable SANS and IEC standards
 - All parts of the installation are correctly selected and erected
 - No part of the installation is visibly damaged or otherwise defective
 - The installation is suitable for the environmental conditions; and
 - The installation complies with this Specification
- Testing of Installation
- On satisfactory completion of the inspections specified in 5.2.1, the following tests shall be undertaken in the sequence listed as per SANS 10142-1:

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Continuity of conductors
- Resistance of earthing conductor
- Continuity of ring circuits earth fault loop impedance at main switch
- Elevated voltage on supply neutral earth resistance
- Insulation resistance
- Voltage, main distribution board - no load
- Voltage, main distribution board - on load
- Voltage at available load
- Operation of earth leakage units
- Earth leakage test button
- Polarity at points of consumption
- Switching devices

C3.3.4.2.8 E100.8 STREET AND AREA LIGHTING

C3.3.4.2.8.1 E100.8.1 SCOPE

a) Application

- This document specifies the general requirements and related tests for Street and Area Lighting. It covers the classification, marking, mechanical and electrical construction of luminaires, poles and high masts.
- Installation Performance Requirements
- The installation shall be suitable for its intended duty with respect to the operating conditions of the electrical system and the electrical load requirements.
- The installation shall be suitable for the environmental conditions, particularly with respect to corrosion resistance and ingress protection.

C3.3.4.2.8.2 E100.8.2 STANDARDS

a) Associated Documentation

- This Specification identifies the Employer's standard modifications and requirements which shall be applied to the statutory and recognized standards. The detailed specification of the project or site-specific requirements will be found in the Particular Specification and its accompanying Technical Data Sheets, which shall be read in conjunction with this Specification.
- Any items not specifically detailed in this Specification, which are necessary to provide a safe and fully operational working system, shall be deemed to be included.
- The Contractor shall operate an auditable quality assurance procedure covering the design, construction, inspection and testing of the installation.

b) Regulations, Specifications and Standards

- The design, construction, inspection and testing of the installation shall comply with all relevant Statutory Regulations and Directives including:
 - Occupational Health and Safety Act (Act 85 of 1993)
 - Construction Regulations 2003 issued in terms of Section 43 of the Act
 - Local Fire Regulations; and
 - Regulations and by-laws of the Local Supply Authority

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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and the latest editions (current at the time of Tender) of all relevant South African National Standards, as well as International Standards, including but not limited to:

Table 19 Section 8: Reference standards

Standard Number	Description
SANS 32	Internal and/or external protective coatings for steel tubes - Specification for hot dip galvanized coatings applied in automatic plants
SANS 97	Electric cables – Impregnated paper insulated metal-sheathed cables for rated voltages 3,3/3,3kV to 19/22kV (excluding pressure assisted cables)
SANS 121	Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods
SANS 156	Moulded-case circuit-breakers
SANS 164	Two-pole and earthing-pin plugs and socket outlets
SANS 475	Luminaires for interior lighting, street lighting and floodlighting - Performance requirements
SANS 767	Earth leakage protection unit
SANS 950	Unplasticized polyvinyl chloride rigid conduit and fittings for use in electrical installations
SANS 1063	Earth rods, couplers and connections
SANS 1085	Wall outlet boxes for the enclosure of electrical accessories
SANS 1088	Luminaire entries and spigots
SANS 1091	National colour standards of Paint
SANS 1195	Busbars
SANS 1213	Mechanical cable glands
SANS 1239	Plugs, socket-outlets and couplers for industrial purposes
SANS 1266	Ballasts for discharge lamps (excluding tubular fluorescent lamps)
SANS 1411	Materials of insulated electric cables and flexible cords
SANS 1431	Weldable structural steels
SANS 1507	Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V)
SANS 1700	Fasteners
SANS 1777	Photoelectric control units for lighting
SANS 1783	Sawn softwood timber
SANS 1973	Low-voltage switchgear and control gear Assemblies
SANS 2001	Construction Works
SANS 10155	Accuracy in buildings
SANS 10199	The design and installation of earth electrodes
SANS 10225	The design and construction of lighting masts
SANS 10177	Fire testing of materials, components and elements used in buildings Part 2: Fire resistance test for building elements
SANS 10142-1	Wiring of Premises Part 1: Low Voltage Installations
SANS 10400	The application of the National Building Regulations
SANS 60269	Low-voltage fuses
SANS 60309	Plugs, socket-outlets and couplers for industrial purposes

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

Standard Number	Description
SANS 60529	Degrees of protection provided by enclosures (IP Code)
SANS 60614-2	Conduits for electrical installations - Particular specification for conduits
SANS 60669	Switches for household and similar fixed-electrical installations
SANS 60947	Low-voltage switchgear and control gear
SANS 61000	Electromagnetic compatibility (EMC)
SANS 61010	Safety requirements for electrical equipment for measurement, control, and laboratory use
SANS 61048	Auxiliaries for lamps - Capacitors for use in tubular fluorescent and other discharge lamp circuits - General and safety requirements
SANS 61238	Compression and mechanical connectors for power cables for rated voltages up to 30 kV (Um = 36 kV)
SANS 61643	Low-voltage surge protective devices
Other Standards	Description
ARP 035	Guidelines for the installation and maintenance of street lighting
BS 88	Specification of supplementary requirements for fuses of compact dimensions for use in 240 / 415 V industrial and commercial electric installations
IEC 157	Low voltage switchgear and control gear
IEC 408	Low voltage air-break switches, air-break disconnectors, air-break switch disconnectors and fuse combination units
IEC 12373	Aluminium and aluminium alloys. Anodizing. Method for specifying decorative and protective anodic oxidation coatings on aluminium
IEC 50086	Conduit systems for cable management
IEC 60898	Specification for circuit-breakers for overcurrent protection for household and similar installations

C3.3.4.2.8.3 E100.8.3 LUMINAIRES

a) General

- Luminaires shall be delivered within 12 months from being manufactured and shall be delivered to site unused with protective wrappings.
- Luminaires shall be delivered, stored and handled in accordance with the manufacturer's instructions. Where the performance of the luminaire is likely to be adversely affected, all necessary precautions shall be undertaken.
- They shall be protected against mechanical damage.
- Samples
- If required by the Employer, a sample of every luminaire offered shall be submitted to the Employer for approval. Acceptance of the samples by the Employer shall not place the Employer under any obligation.

b) Classification

- All luminaires shall have been type tested to SANS 60598-1 and 60598-2-3 by a SABS-approved certification authority (Contractor to furnish test certificates to the Engineer upon request to do so)

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- All luminaires shall be of the totally enclosed type. Luminaires shall be adequately and securely fixed to the pole or bracket, allowing for adjustments and when adjusted shall be fixed and remain locked in the set position. Spigot entries shall comply with Table 1 of SANS 1088.
- Luminaires shall be constructed to inhibit the ingress of dirt, moisture and insects. The minimum IP rating for the lamp and control gear compartments shall be IP 65. IP rating shall comply with SANS/IEC 60529.
- All luminaires shall comply with the recommendations and references of Chapter 4 of ARP 035.

c) Marking

- Self-adhesive labels indicating the type and wattage of the lamp shall be stuck to the underside of the luminaire housing and shall be visible when the luminaire is mounted on a pole. Luminaires suitable for use with tubular lamps shall be indicated as such, with the letter "T" and luminaires for elliptical lamps with the letter "E", after the wattage. Letters shall be at least 40 mm in height and be black against the following background colours:

Table 20: Background colours to labels

Lamp	Colour
High pressure sodium vapour	orange
High pressure mercury vapour	blue
Metal halide	green

d) Construction

- The housing shall be robustly constructed, weatherproof, hail proof, corrosion proof and vandal resistant. It shall be manufactured from filled ultraviolet stabilized engineering polymer, aluminium or dough moulding compound (DMC).
- The diffuser shall be constructed from injection moulded high impact acrylic or otherwise toughened heat and impact resistant glass and shall not accumulate dirt reducing the light output. Polycarbonate shall not be used as it discolours and loses its impact resistance when exposed to the UV emitted by the sun or the light source.
- Luminaires with a sealed optical compartment allowing lamp replacement from above, which does not require opening the diffuser bowl for lamp replacement, shall be preferred. If the diffuser has to be opened for lamp replacement, the diffuser shall be held in place by stainless steel clips, ensuring the diffuser is closed even if one clip is broken. The diffuser shall remain attached to the housing when opened for maintenance or lamp replacement.
- A silicon rubber gasket shall be used to seal the lamp compartment. It shall be fitted into a groove in the housing and be kept in place to ensure the integrity of the IP rating. Neoprene or felt gaskets shall not be acceptable.
- An exterior lip shall be provided on the housing to ensure that there is no direct rainwater contact with the gasket between the housing and the diffuser, thus ensuring that no moisture is sucked into the diffuser when the luminaire is switched off and cools down.
- Anodized aluminium shall be used for a reflecting material, and the anodizing process shall comply with the requirements of BS 1615. The plate shall be thick enough not to become warped or distorted by the heat coming from the lamp. The reflector shall be permanently fitted into the housing. Luminaires shall preferably be of the semi-cut-off (SCO) distribution, unless the design requires a cut-off (CO) distribution. The luminaires shall be marked with the type of light distribution.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- If a luminaire has an adjustable light distribution, either by setting of the optical system, or orientation of reflectors or of the lamp-holder, adjustment markings shall be provided on the luminaire body, and information shall be provided by the manufacturer on the light distribution classification for each setting. The marking shall be made in a clear and indelible manner.
- The lamp-holder shall comply with VC 8011, shall be rated for 240 °C and shall not be susceptible to possible loosening of the lamp caused by vibrations. The lamp-holder and end caps shall be made of porcelain, having silver plated metal parts being of the GES type and able to withstand the high starting voltage. The centre contact of the lamp-holder shall be spring loaded and shall not deteriorate under normal working conditions.
- All control gear shall be housed within the body of the luminaire in a separate gear compartment sealed with a hinged, non-corrosive lid. Covers and other parts that provide protection against electric shock shall have adequate mechanical strength and shall be reliably secured so that they will not work loose whilst in service. For ease of maintenance, all control gear components shall be mounted on a removable gear tray. Luminaires that have a sealed optical compartment, with lamp replacement from above, shall also have a control gear compartment accessible from above.
- The control gear shall be removable and suitable for operation with the specified rating of the lamp on a 230 V $\pm$ 10% 50 Hz single-phase system. All internal wiring shall be protected against abrasion and heat, by using appropriate insulation or sleeve. All screws, bolts and metal parts shall be of stainless steel or non-corrosive materials.
- Lamp capacitors shall be manufactured fully in accordance with SANS 1250-1979 and shall be designed when used with the lamp and ballast provided to improve the overall power factor to at least 0.95 lagging. Capacitors shall be fitted with safety discharged resistors and shall be provided with approved nameplates setting out the details of the capacitors.
- Lamp ballasts shall comply with the requirements of SANS 1266 and shall be rated for the service required of them and shall be suitable for use with the lamps specified. Ballasts shall be of the totally encapsulated type having terminal blocks for ease of maintenance. The ballasts shall be provided with approved nameplates setting out the particulars of the ballast. The electronic ignition device shall be of the three wire type operating on the superposed pulse principle. The circuiting shall be such that shall a lamp fail the ignition shall not continue pulsing.

e) Area (Flood) Lights

- The luminaires shall be of the totally enclosed weatherproof type complete with a suitable lamp with integral mounted igniter and control gear.
- The housing shall be robustly constructed of die cast LM6 aluminium alloy or other corrosion proof and UV resistant material and be effectively sealed to inhibit the ingress of dirt, moisture and insects
- The front glass cover shall be constructed from heat resistant armoured glass having retaining clips, fasteners, etc., manufactured from stainless or ferritic steel. The fitting shall incorporate a protractor scale to allow for the correct and accurate adjustment of the downward to vertical aiming angle.
- The internal wiring shall be by means of high temperature grade silicone rubber insulated high quality flexible stranded cables not subject to deterioration. The low voltage wiring shall not be less than 660 volt grade and in the case of high voltage wiring the continuous voltage grade must be suitable for the open circuit voltage of the ballast.
- The compartment in which the control gear is located shall be accessible to provide ease of maintenance. This compartment shall be complete with earthing terminal and 660 volts insulated line connector block.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- Capacitors shall be metal clad, totally enclosed type complete with sealed in cable tails. Capacitors shall be manufactured fully in accordance with SANS 1250 and be capable of improving the overall power factor to at least 0.95 and be fitted with safety discharged resistors.
- Chokes shall be of the totally encapsulated type having terminal blocks for ease of maintenance.
- The electronic ignition device shall be of the three wire type operating on the superposed pulse principle.
- The circuiting shall be such that shall a lamp fail the ignition shall not continue pulsing.
- The lamp-holder end cap shall be porcelain, having silver plated metal parts being of the GES type and able to withstand the high starting voltage. The lamp-holder shall incorporate a spring wire type supporting device at the end of the lamp opposite the cap.

C3.3.4.2.8.4 E100.8.4 STREETLIGHT AND AREA LIGHTING POLES

a) General

- All poles shall be designed to withstand all static and dynamic loads on the fully equipped pole.
- Lighting columns shall be installed according to with the ARP 035.
- Unless otherwise specified poles having a luminaire mounting height less than 11,5 m shall be of glass filament wound (GRP) manufacture; poles having a luminaire mounting height more than 11,5 m shall be of steel.

b) Design parameters

- All poles shall comply with SANS 10225, under the following requirements:
 - Terrain category : 3
 - Design wind speed : 144 km/h
 - Altitude (above sea level) : 1000 m
 - Minimum safety factor : 1.5
- The horizontal and vertical deflections shall not exceed the requirements of SANS 10225.

c) Poles for streetlights

- The streetlight poles shall be manufactured from either steel or glass filament wound polyester and shall be of the round cross-section (tubular) tapered type. The poles shall have a luminaire mounting height as specified in the particular specification with or without a single or double outreach.
- The spigot for the mounting of the luminaire on the outreach arm shall be round with an external diameter of 40 mm and a length of 100 mm. The spigots shall be such that when the luminaires are mounted, they shall be at an angle of 15° to the horizontal or as otherwise specified.

d) Poles for area lighting

- The poles for the area lighting shall be manufactured from either steel or glass filament wound polyester and shall be of the straight round cross-section tapered type. The poles shall be suitable for the mounting of post top type luminaires at a mounting height as specified in the detail specification.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- The spigot for the mounting of the luminaire shall be round with an external diameter of 75 mm and shall have a length of 100 mm.

e) Cable entries

- The poles shall be provided with a cable access opening suitable for installing at least three 16 mm², 4-core street lighting cables.
- The edges of the access opening shall be smooth to prevent any damage to the cables.
- The access opening shall be positioned such that the opening is at least 500 mm below ground level after the pole has been erected.

f) Access Aperture

- At a height of at least 600 mm above ground level an opening, 240 mm high by 80 mm wide, shall be provided on the poles. The opening shall be covered with a weatherproof cover plate with a profile similar to that of the pole. The cover plate shall be manufactured from the same material as that of the pole and the thickness thereof shall not be less than that of the pole. The cover plate shall be fixed to the pole by 10 mm hexagonal brass nuts.
- A mounting plate suitable for mounting equipment shall be fixed to the pole on the inside of the access opening. A clip tray / DIN-rail for two circuit breakers, a clip tray for four "Clip-on" type terminal blocks and a gland plate to take up to three cables shall be installed on the mounting plate. A 10 mm earth stud of adequate length shall be either installed on the mounting plate or shall be welded on the inside of the pole.
- The pole shall be fully equipped with the low voltage equipment specified in the detail specification.

g) Pole baseplates

- Each of the poles shall be provided with a steel baseplate with a diameter of at least 350 mm and a thickness not less than 4 mm.
- The baseplates shall be supplied complete with hook bolts and fasteners.

h) Finishing

- Steel poles
 - All welding on steel poles shall be smooth and neat in accordance with SANS 10225. No splatter, slag or blister shall be visible.
 - All parts of the streetlight pole, including cross-arms shall be hot dip galvanised in accordance with SANS 32 and SANS 121 and test certificates shall be provided if required. No welding, drilling, punching, bending or removal of burrs shall be carried out after galvanising.
 - For added protection against corrosion the pole shall be dipped in tar up to 500 mm above the finished ground level.
- Glass filament wound polyester poles
 - The pole shall be constructed by the filament winding process to achieve optimum results for strength and rigidity. The filament winding process shall be continuously applied with uniform tension onto a rotating mandrel and shall result in a minimum mass glass to resin ratio of 70:30. The surface shall be seamless, smooth and tapered.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- The material of the finishing coat shall be a gel coat that shall comply with the requirements of SANS 141 and shall be applied to a uniform thickness of between 250 and 500 microns. It shall provide a weatherproof, UV resistant, and flame-resistant and impact strong surface in the colour specified.
 - The pole shall be manufactured in accordance with SANS 1749 under the ISO 9002 quality system and shall bear the applicable mark.
 - If an access opening is required, the cut-out shall be covered by an access door cover manufactured from glass filled nylon impregnated in the same colour as that of the surface coat. It shall be secured to the pole by two stainless steel Allen head captive screws into M4 brass inserts embedded in the pole.
- Concrete
- Spun reinforced concrete poles shall be manufactured in accordance with SANS 470.
- Wood
- SANS 754 eucalyptus trees and SANS 753 pine trees comprises the specification for wooden poles used for electrical reticulation including streetlights.

C3.3.4.2.8.5 E100.8.5 HIGH MAST LIGHTING

i) General

- The mast shall be of octagonal cross section, tapered, with the mounting height of the luminaires specified in the detail specification. The mast shall be designed to SANS 10225 Code of Practice and when fully equipped with the luminaires shall withstand a wind velocity appropriate to the site conditions. The deflection at the top of the mast shall not exceed 2.5% of the mast height when subjected to two thirds of the maximum wind velocity.
- The masts shall be designed for mounting on a reinforced concrete foundation by means of a base plate secured to bolts casted into the foundation. Additional gussets shall be provided between the base plate and the mast. No steel used in the construction of the mast shall be less than 5 mm in thickness and all steel shall comply with the requirements of BS 4360 grade 43A.
- An aperture shall be provided on the side of the mast base compartment to afford ample and easy access to the equipment installed therein. The opening shall be fitted with a lockable, close fitting cover fully sealed against the weather. The perimeters of the opening shall be reinforced with fully welded sheet sections to restore the section modulus and to prevent buckling. Welding shall be in accordance with BS 135 and shall be carried out by qualified welders.
- Each mast shall be provided with a bracket to mount the luminaires as specified.
- All ferrous parts of the mast shall be hot dipped galvanized after fabrication in accordance with SABS 763.
- Each mast shall be provided with an internal distribution board with:
 - 3-pole main switch
 - a single phase earth leakage unit

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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- 10 x 10A SP circuit breaker
- 15 A, 3-pin switched socket outlet
- time switch or photocell
- contactors for control

— Additional power requirements for the rail row and hydro masts:

- One 15 amp 3 pin industrial type, switched socket outlet for the hydraulic unit
- One adequately rated triple pole isolator
- One 15 amp single pole and neutral moulded case breaker with integral 20 amp earth leakage protection device for control of the switched socket outlet
- Three adequately rated single pole circuit breakers for the control of the luminaires
- One 4 way neutral bar
- One 4 way earth bar

— All design calculations are to be submitted at time of tender for evaluation by an independent structural Engineer. Failure to submit this documentation will result in a disqualification from the tender.

— The mast manufacturer shall be ISO 9001 – 2000 certified. Failure to submit the proof of certification from your mast supplier may render your tender invalid.

j) Mid-hinge mast

- The mast shall be constructed to form a continuously tapered, totally enclosed, octagonal shaft.
- The mast must consist of a fixed lower part and a moving part hinged to the fixed part at approximately half the height of the mast. The moving part of the mast shall have the floodlight cross-arm mounted on it and must be adequately counterbalanced. The hinge must be made from stainless steel.
- The moving portion shall consist of sections fitted together on site by slip-joints. No welding on site is allowed.
- During raising and lowering and while in the horizontal position, the mast must withstand the wind forces from any direction as well as its own weight and any inertial effects due to sudden stoppage.
- An opening shall be provided in the base of the mast for access to the electrical distribution board. The opening shall only be accessible after the mast lid section has been hinged open. A safety chain must be provided which will ensure safe working conditions while work is conducted on the distribution board.
- The mast must be lowered and raised with a lightweight, manually operated but robust portable winch which can be stored in the base compartment.
- The winch unit must be securely attached to fixed lower part of the mast and the winch cable to the movable part.
- A spring-loaded gravity ratchet must ensure that when the operating handle is released during the raising and lowering operation, the moving part stops in whatever position it is in. The ratchet must be fitted with a lever which must be depressed with a constant pressure during the whole operation of lowering the mast. A round bracket must be welded into the top fixed part of the mast to prevent damage to the trailing cable while lowering or raising the mast.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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Particular Specifications



- The luminaries must be permanently connected to the supply cable, to facilitate testing when the mast is in the lowered position. No additional cable or connections are allowed.
- Masts which require any form of power disconnection while being lowered will not be considered.
- Rail Row Masts
- The mast shaft shall be multi sectional. Each section is constructed from a steel plate, which is cut to size, bent into a 6-sided “half shell” and welded together. Rolled sections will not be accepted.
- Two “half shell” sections are then welded together by means of a continuous long seam weld, to form this section of the mast shaft.
- The floodlight luminaire Ring shall be manufactured in two half-sections, which are bolted together on site. The ring is of a welded steel construction and hot dipped galvanised for corrosion protection. The luminaire ring shall be manufactured from 76 x38 rolled channel section and shall be fitted with a 20mm diameter steel bumper ring below the rolled channel. The luminaire ring shall dock into three guides fixed to the top pulley assembly.
- The top pulley assembly consists of a fabricated steel housing, containing the 2 x 280 mm diameter; LM6 cast aluminium pulleys, over which the steel wire ropes pass. Separators – one between the pulleys and one on the outside of each pulley – are provided, to separate the wire ropes and trailing cables and to prevent these from wrapping together, shall the ring be lowered in windy conditions. Each external separator has two close-fitted guides on the outside, to prevent the wire ropes and cables from climbing off the pulleys. Additional deep-groove pulleys are fitted for the electrical trailing cables. All pulleys shall run on stainless steel shafts. The entire assembly is protected against the ingress of water, with a moulded fibreglass canopy, which is bolted to the assembly, with a bolt which incorporates a lightning spike.
- Two steel wire ropes shall be supplied for the purposes of lowering the luminaire ring. All rope connections are done by means of copper “TALURIT” ferrules and crimped with hydraulic crimping tools. The breaking load of the ropes shall be calculated and designed by an Engineer to adequately raise and lower the specified luminaires and luminaire mounting ring.
- The portable winch, used for the raising and lowering of the luminaire ring, shall be a double drum type, as this unit meets all International safety requirements, ensuring that, even in the event of one of the ropes breaking, the luminaire ring is still secured by the second rope. Single drum winch systems WILL NOT BE CONSIDERED. The worm and wheel of the winch are fully immersed in an oil bath and have a gear ratio of 50:1. The winch ropes are terminated in such a manner that distortion and twisting of the ropes is prevented and four turns of the rope remain on the drum, after the ring has been completely lowered. The driving spindle of the winch is automatically locked, when not in use.
- The standard power tool used to drive the winch is a single-phase, single speed electric motor, fitted with a reduction gear box. The power tool, which is slotted into the winch slide, when in use, is supplied complete with a 3 metre cable and remote forward/reverse control switch, for safe operation. The power tool is fitted with a torque limiting device, which is set to slip before any damage can be done to the wire ropes, in the event of over-winding. Hydraulic Power tools shall not be considered
- The following electrical equipment is to be included:
 - The electrical trailing cable, which supplies power to the floodlight luminaires, shall vary in size, depending on the electrical load to be carried and whether or not a photocell is

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



installed on the luminaire ring. The cable shall be 4 mm flexible, multicore, and unarmoured, with "Nitril" insulation. The lower end of the cable terminates in a multi-pin male socket, which in turn, plugs into a multi-pin female socket, mounted in the mast distribution board. The upper end of the cable is fixed to the luminaire ring by means of a cast aluminium clamp and terminates directly in the junction box, mounted on the luminaire ring.

- A weather-proof junction box shall be fixed to the luminaire ring and provides the termination point for the trailing cable, as well as for the cables which supply power to the floodlight luminaires. The junction box is also fitted with a multi-pin plug, which accepts a test lead, used to test the floodlights, with the ring in the lowered position.
 - If required, the mast can be fitted with a photocell (daylight switch) to switch the floodlights on and off.
 - The mast shall be fitted with a totally enclosed, fibreglass distribution board, fitted in a convenient position in the base of the mast and accessible through the mast access door. The equipment fitted to the distribution board shall vary.
- The mast shall be bolted to a chimney and pad type reinforced concrete foundation with cast in foundation bolts. The design and dimensions of the foundation shall depend on factors such as wind velocity size of mast and soil conditions. Designs for foundations are to be signed off by a registered Engineer before construction is started.

k) Hydro Masts

- The mast is made up of two, three or four sections, each with a length of up to approximately 12 m for ease of galvanizing and transportation to site. Each section is constructed from a steel plate, which is cut to size, bent into a six-sided "half shell" and welded together. Two "half shell" sections are then welded together by means of a continuous long seam weld, to form a section of the mast.
- An opening of approximately 250 mm x 750 mm is cut out in the base of the mast. The top and bottom of the opening are curved to avoid stress-concentrations in the corners. The opening perimeter is strongly reinforced to maintain the section modulus of the mast shaft and to prevent buckling. The door provides easy access to the distribution board and ancillary equipment. A weather hood provides protection against ingress of water.
- The size and material thickness of the base plate and gussets depend on the Height and number and type of luminaires installed on the mast. The material is carefully inspected while being flame cut and if required an ultra-sonic inspection shall be carried out. The base plate is welded to the fixed lower section of the mast. Gussets disperse the stress concentrations between the bottom of the mast and the base plate. Two of these gussets (ram lugs) have holes to accept the pivoting pin for attachment of the hydraulic ram.
- One or two 100 mm cable sleeves must be cast in the concrete foundations. A hole in the base plate provides access to the mast for looping in and out of the supply cables.
- The hinge is situated approximately 1.25 m above the base of the mast. The mast, when lowered, shall remain in a horizontal position to facilitate easy maintenance to the luminaires. Fixing points (ram lugs) for the hydraulic rams are provide on the base and the movable upper section. The latter passes through the mast and is welded to the mast on either side. A self-locking mechanism is provided in the base of the mast, securing the upper section in the vertical position even in windy conditions with the wind blowing in any direction. The release handle can only be operated after the hydraulic ram has compressed the neoprene pads, situated between the base and the movable section of the mast.
- Lowering and raising is done with a portable, double acting hydraulic ram, pulling the mast down during lowering and pushing it up during raising. The hydraulic ram can only be operated when the control lever is pushed and held in the operating position; when the control lever is released, the mast stops in whatever position it is in. The ram is securely

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



attached to the upper and lower sections of the mast and cannot be removed during the operation. The ram is fitted with a non-return valve with a limiting oil flow by-pass orifice, ensuring a carefully controlled, pre-determined speed of lowering and preventing any increase in speed in the unlikely event of a complete hydraulic failure or severing of hoses. Heavily loaded 25 m and 30 m masts require a double ram and the 40 m three rams. The hydraulic pump with electric motor is permanently fixed on a trolley which can easily be moved from mast to mast. The ram, when not in use, is firmly attached to the trolley. One unit shall serve any number of masts. With very large installations, it is recommended that a trailer, which can be towed by a vehicle be used, rather than a trolley.

- Cross arms or luminaire brackets are provided on the top of the mast to suit the required type and number of luminaires.
- The design and the dimensions of the concrete foundation depend on mast height, wind velocity, number and type of luminaires as well as the soil conditions. It is important to take into account the position of the luminaires and the direction in which the mast must be lowered when founding the foundation and foundation bolts. Foundation bolts are Hot-Dip galvanized. M39 bolts are normally used; the quantity and centres are determined by the size of the mast and the number of luminaires installed. Lighting Structures shall design and construct the foundations on site if required.
- A 5-core flexible neoprene mains supply trailing cable is provided between the distribution board and the weatherproof junction box on the top of the mast. The junction box is fitted with an earth and neutral bars and the required number and size of the cable glands. Each luminaire is connected to the junction box with a 3 core 1.5 mm flexible neoprene cable. The luminaires can be tested in the lowered position without the need of extra cables or connections.
- An earthing stud is welded to the mast structure adjacent to the distribution board. Incoming cables can be connected to this stud.
- A totally enclosed fiberglass power distribution board is mounted in an easily accessible position in the base compartment of the mast. The board is provided with a front cover panel with only the operating toggles of the isolator and circuit breakers protruding.
- The distribution board shall be equipped as described above.

C3.3.4.2.8.6 E100.8.6 PHOTOCCELL (DAY/NIGHT SWITCH)

a) General

- The switches are to be used to control streetlights or high mast lighting and shall be fitted with switch contacts able to carry not less than 6A. The current shall not exceed 50mA during no-load conditions.
- The units shall be suited to 240V $\pm$ 6%, 50Hz single-phase alternating current.
- The units shall be weatherproof and vibration-resistant as they are to be mounted on top of streetlight luminaires. The units shall be designed to withstand damage by either stone-throwers or hail. If the units do not possess this quality, separate wire screens shall be provided for this purpose. The units shall be supplied with a standard NEMA plug and socket. The socket shall have an arm for mounting on a pole. All parts shall be treated to be corrosion-proof. The units shall be capable of operating in dusty conditions between – 5°C and + 55°C.
- The units shall switch on when the light intensity drops to 15 lx $\pm$ 20% and switch off when the light intensity reaches 40 lx $\pm$ 20%. When the unit is in the on position, there shall be a time delay of approximately one minute before it switches off due to a sudden increase in the light intensity.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- The design of the switch shall ensure a positive on and off switching at all times.

b) Mounting of photocell

- The photocell shall be mounted on the luminaire closest to the miniature substation the streetlight circuit is to be supplied from by making a hole in the luminaire and fixing the photocell base to the luminaire. The photocell shall be connected to the streetlight control equipment in the streetlight compartment by means of a 1.5 mm², 3-core, copper conductor, PVC, SWA, PVC, cable.
- Where streetlights are to be separately controlled, the photocell shall be mounted onto the luminaire and shall be directly connected to the luminaire.

C3.3.4.2.8.7 E200.8.7 INSTALLATION

a) General

- If not indicated on drawings, in multiphase street and area lighting installations the circuit arrangement shall be such that adjacent lighting columns are fed from different phases, i.e. staggered such that the neutral current after every third column measures 0A (ignoring here n-th order harmonics). Similarly, where two lighting columns are located opposite each other on a road or street, they shall be fed from different phases. Where road curvature makes this impossible to do and the road has an intersection, the circuit arrangement shall be such that the failure of a phase shall have the least possible effect on illuminance at the intersection. Furthermore, and not diminishing the requirement of above provisions, where multiple luminaires are connected to the same lighting column they shall be fed from separate phases.
- A loop-in cabling system, where single or multiphase cables are looped from source to lighting column to lighting column, shall be employed. Tee-offs will not be accepted (except for the wiring from terminals inside a lighting column to luminaire(s) mounted on the relevant column). Only Pratley or equivalent “end connectors with insulating sleeves” will be accepted.
- For TN-C-S-wired street or area lighting installations, the neutral conductor shall not be connected to the earth conductor downstream of the point of control. Only where required by the electrical supplier shall the circuit breaker inside lighting columns be deemed the point of control.

b) Setting of the works

- The Contractor shall set out the positions of the poles and the cable route as indicated on the drawings. The distance between the poles shall be maintained as specified.
- Where cable route drawings are not provided, cables shall be installed strictly in accordance with the requirements of the local government authority, and in the registered servitude made available for this usage to such authority by the Surveyor-General.

c) Excavations

- The holes for poles shall be excavated to the following depths:

Table 21: Depth of holes for poles

Description	Mounting Height (m)	Buried (m)	Depth

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

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Building Upgrade for the Mega Warehouse
In Langlaagte Depot
Particular Specifications



Streetlight Poles	>10.5	2
Streetlight Poles	7.5 > 10.5	1.8
Area lighting Poles	> 3.5	1

- The holes for poles shall have minimum dimensions of 1 metre by 0.5 metres. Once the poles have been erected and aligned the excavations shall be backfilled and compacted in layers of 150 mm to 95% MOD AASHO using material free of stones and vegetation. Where the soil is sandy, loose or marshy, the poles shall be planted in a 12:1 sand/cement mixture.
- Where foundations are required, a minimum of 2 x 50 mm sleeves shall be installed for the installation of cables.

d) Planting of poles

- The steel and glass filament wound polyester poles shall be fitted with a base plate that shall be securely bolted with hook bolts before the pole is planted.
- The Contractor shall ensure that the poles are not strained or damaged in any way during erection.
- The structures shall be vertical to a tolerance of 0,5% after erection (i.e. the horizontal deviation of the centre of the cross section of the top of the pole from a vertical line originating from the centre of the cross section at the base of the pole shall not be more than 0,05% its height).
- The streetlight poles shall be planted with the luminaire outreach extended in the direction of the roadway and so that the outreach arm is perpendicular to the centre line of the road, except if otherwise specified by the Engineer.
- Where streetlights are installed, the access opening shall be on the opposite side of the direction of the oncoming traffic in the lane closest to the pole (such that any personnel conducting maintenance inside the access opening shall face oncoming traffic).
- Under no circumstances shall poles be shortened to create the impression that they have been planted to the correct depth.

e) Installation

- Each pole shall be fitted with an equipment mounting plate fixed inside the pole. The cables shall be terminated on the gland plate fitted to the mounting plate by means of cable glands.
- A 10A circuit breaker with a 6kA breaking capacity shall be installed for each luminaire in each pole.
- Terminals as specified elsewhere and suitable for the particular cable size shall be used.
- The cable armouring and the earth continuity conductors shall be terminated on the earth stud provided in the pole by means of crimped lugs.
- The connection between the terminals at the access opening and the terminal block of the luminaries shall be made using two PVC insulated 1.5 mm² copper conductors, red for the phase and black for the neutral conductor, and a 1.5 mm² bare copper earth wire for the earth connection.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4



- After the pole has been planted and the conductors have been drawn in, the streetlight luminaire shall be mounted on the spigot and securely fastened with the bolts and/or nuts to the pole.
- All the bolts, nuts, screws and clips of the fitting shall be properly screwed.

C3.3.4.2.8.8 E100.8.8 DRAWINGS AND DOCUMENTATION

a) General

- Drawings and documentation shall be provided in accordance with the general drawings and documentation standard specifications.

b) Drawings

- The following drawings shall be submitted with the tender:
 - Street and area lighting poles
 - Dimensioned drawing of the poles
 - Detail drawing of the equipment mounting plate
 - Fixing detail of access opening cover plate
 - Streetlight support arm
 - Dimensioned drawing of the support arm
 - Dimensioned drawing of fixing bracket

C3.3.4.2.8.9 E100.8.9 TESTING AND COMMISSIONING

a) General

- Testing of the streetlight luminaires and poles, area lighting luminaires and poles and high mast lighting shall be tested according to the relevant Testing and Commissioning specification.

Employer:		Contractor:	
Witness:		Witness:	

Volume	1	2	3			
Part	T1	T2	C1	C2	C3	C4

Employer:		Contractor:	
Witness:		Witness:	