

BILLS OF QUANTITIES : BUILDING WORKS

REFURBISHMENT AND UPGRADE OF SA TOURISM HEAD OFFICE
BOJANALA HOUSE, 90 PROTEA RD, CHISLEHURSTON, JOHANNESBURG
SAT 286/25

Item No		Quantity	Rate	Amount
	<u>BILL NO 1</u> <u>PRELIMINARIES</u> <u>BUILDING AGREEMENT AND PRELIMINARIES</u> The JBCC Principal Building Agreement (Edition 6.2 - May 2018) prepared by the Joint Building Contracts Committee shall be the applicable building agreement, amended as hereinafter described The JBCC Principal Building Agreement contract data form an integral part of this agreement The JBCC General Preliminaries (May 2018) published by the Joint Building Contracts Committee for use with the JBCC Principal Building Agreement (Edition 6.2 - May 2018) shall be deemed to be incorporated in these bills of quantities, amended as hereinafter described The contractor is deemed to have referred to the above-mentioned documents for the full intent and meaning of each clause The clauses in the above-mentioned documents are hereinafter referred to by clause number and heading only Where any item is not relevant to this agreement such item is marked N/A signifying "not applicable" Where standard clauses or alternatives are not entirely applicable to this agreement such amendments, modifications, corrections or supplements as will apply are given under each relevant clause heading and such amendments, modifications, corrections or supplements shall take precedence notwithstanding anything to the contrary contained in the above-mentioned documents			
	Carried Forward Bill No. 1 PRELIMINARIES		R	

	Brought Forward <u>PREAMBLES FOR TRADES</u> The General Preambles for Trades 2017 published by the Association of South African Quantity Surveyors shall be deemed to be incorporated in these bills of quantities and no claims arising from brevity of description of items fully described in the said General Preambles will be entertained Supplementary preambles and/or specifications are incorporated in these bills of quantities to satisfy the requirements of this project. Such supplementary preambles and/or specifications shall take precedence over the provisions of the General Preambles The contractor's prices for all items throughout these bills of quantities shall take account of and include where applicable for all of the obligations, requirements and specifications given in the General Preambles and in any supplementary preambles and/or specifications <u>STRUCTURE OF THIS PRELIMINARIES BILL</u> Section A : A recital of the headings of the individual clauses in the aforementioned JBCC Principal Building Agreement Section B : A recital of the headings of the individual clauses in the aforementioned JBCC General Preliminaries Section C : Any special clauses to meet the particular circumstances of the project <u>PRICING OF PRELIMINARIES</u> Should the contractor select Option A in the contract data for the adjustment of preliminaries, the amounts entered against the relevant items in these preliminaries are to be divided into one or more of the three categories provided namely fixed (F), value related (V) and time related (T) <u>SECTION A: PRINCIPAL BUILDING AGREEMENT</u> Carried Forward Bill No. 1 PRELIMINARIES		R	
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	Brought Forward <u>Interpretation (A1-A7)</u> 1 Clause 1.0 - Definitions and interpretation Pricing of bills of quantities The contractor is to allow opposite each item for all costs in connection therewith. All prices to include, unless otherwise stated, for all materials, fabrication, conveyance and delivery, unloading, storing, unpacking, hoisting, labour, setting, fitting and fixing in position, cutting and waste (except where to be measured in accordance with the standard system of measurement), patterns, models and templates, plant, temporary works, returning of packaging, duties, taxes (other than Value Added Tax), imposts, establishment charges, overheads, profit and all other obligations arising out of this agreement. Value Added Tax (VAT) is to be separately stated on the summary page of these bills of quantities Items left unpriced will be deemed to be covered in prices against other items throughout these bills of quantities and no claim for any extras arising out of the contractor's omission to price any item will be entertained Prices for all construction equipment, temporary works, services and other items shall include for the supply, maintenance, operating cost and subsequent removal and making good as necessary Abbreviated descriptions The items in these bills of quantities utilise abbreviated descriptions. It is the intention that the abbreviated descriptions be fully described when read with the applicable measuring system and the relevant preambles and/or specifications. However, should the full intent and meaning of any description not be clear, the contractor shall, before submission of his tender, call for a written directive from the principal agent, failing which it shall be assumed that the contractor has allowed in his pricing for materials and workmanship in terms of international best practice. Legal status of contractor Carried Forward Bill No. 1 PRELIMINARIES		R	
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	Brought Forward If the contractor constitutes a joint venture, consortium or other unincorporated grouping of two or more persons then: 1. These persons are deemed to be jointly and severally liable to the employer for the performance of this agreement 2. These persons shall notify the employer of their leader who has assigned authority to bind the contractor and each of these persons 3. The contractor shall not alter its composition or legal status without the prior written consent of the employer F:..... V:..... T:..... 2 Clause 2.0 - Law, regulations and notices F:..... V:..... T:..... 3 Clause 3.0 - Offer and acceptance F:..... V:..... T:..... 4 Clause 4.0 - Cession and assignment F:..... V:..... T:..... 5 Clause 5.0 - Documents Value Added Tax Provision is made in the summary page of these bills of quantities for the inclusion of Value Added Tax (VAT) Priced document as specification Clause 5.4 is deemed to be deleted Carried Forward Bill No. 1 PRELIMINARIES		R	
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	Brought Forward F:..... V:..... T:..... 6 Clause 6.0 - Employer's agents Delegated authority The authority of the principal agent to issue contract instructions [17.1] and perform duties for specific aspects of the works is delegated to agents as follows [6.2]. This does not preclude the principal agent from issuing such contract instructions: 1. <u>Architect</u> 1.1 Duties [6.2] : The architect is responsible for the architectural design, functional design and quality inspection of the works 1.2 Contract instructions [6.2; 17.1] : 1.2.1 Rectification of discrepancies, errors in description or quantity or omission of items in the agreement other than in the JBCC Principal Building Agreement 1.2.2 Alteration to design, standards or quantity of the works provided that such contract instructions shall not substantially change the scope of the works 1.2.3 The site [13.0] 1.2.4 Compliance with the law, regulations and bylaws [2.1] 1.2.5 Provision and testing of samples of materials and goods and/or of finishes and assemblies of elements of the works 1.2.6 Opening up of work for inspection, removal or re-execution [23.2.4; 26.4.2] 1.2.7 Removal or re-execution of work Carried Forward Bill No. 1 PRELIMINARIES	Item	R	
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	Brought Forward 1.2.8 Removal or substitution of any materials and goods 1.2.9 Protection of the works 1.2.10 Making good physical loss and repairing damage to the works [23.2.2] 1.2.11 Rectification of defects [21.2] 1.2.12 A list for practical completion specifying outstanding or defective work to be rectified to achieve practical completion, a list for completion and a list for final completion specifying outstanding or defective work to be rectified to achieve final completion 1.2.13 Expenditure of budgetary allowances, prime cost amounts and provisional sums 1.2.14 Appointment of a subcontractor [14.0; 15.0] 1.2.15 Work by direct contractors [16.0] 1.2.16 On suspension or termination, protection of the works, removal of construction equipment and surplus materials and goods [29.0] 2. <u>Quantity surveyor</u> 2.1 Duties [6.2] : The quantity surveyor is responsible for all measurements, valuations, financial assessments and all other quantity surveying and cost control functions of the works 2.2 Contract instructions [6.2; 17.1] : 2.2.1 No contract instructions delegated to the quantity surveyor 3. <u>Mechanical engineer</u> Carried Forward Bill No. 1 PRELIMINARIES		R	
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	Brought Forward 3.1 Duties [6.2] : The mechanical engineer is responsible for all aspects of mechanical engineering design and quality inspection of the works and, where appointed by the employer for quantity surveying services in respect of the mechanical installations, for all measurements, valuations, financial assessments and all other quantity surveying and cost control functions 3.2 Contract instructions [6.2; 17.1] : 3.2.1 Rectification of discrepancies, errors in description or quantity or omission of items in the agreement other than in the JBCC Principal Building Agreement 3.2.2 Alteration to design, standards or quantity of the works provided that such contract instructions shall not substantially change the scope of the works 3.2.3 Compliance with the law, regulations and bylaws [2.1] 3.2.4 Provision and testing of samples of materials and goods and/or of finishes and assemblies of elements of the works 3.2.5 Opening up of work for inspection, removal or re-execution [23.2.4; 26.4.2] 3.2.6 Removal or re-execution of work 3.2.7 Removal or substitution of any materials and goods 3.2.8 Protection of the works 3.2.9 Making good physical loss and repairing damage to the works [23.2.2] 3.2.10 Rectification of defects [21.2] Carried Forward Bill No. 1 PRELIMINARIES		R	
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	Brought Forward 3.2.11 A list for practical completion specifying outstanding or defective work to be rectified to achieve practical completion, a list for completion and a list for final completion specifying outstanding or defective work to be rectified to achieve final completion 3.2.12 Expenditure of budgetary allowances, prime cost amounts and provisional sums 4. <u>Electrical engineer</u> 4.1 Duties [6.2] : The electrical engineer is responsible for all aspects of electrical engineering design and quality inspection of the works and, where appointed by the employer for quantity surveying services in respect of the electrical installations, for all measurements, valuations, financial assessments and all other quantity surveying and cost control functions 4.2 Contract instructions [6.2; 17.1] : 4.2.1 Rectification of discrepancies, errors in description or quantity or omission of items in the agreement other than in the JBCC Principal Building Agreement 4.2.2 Alteration to design, standards or quantity of the works provided that such contract instructions shall not substantially change the scope of the works 4.2.3 Compliance with the law, regulations and bylaws [2.1] 4.2.4 Provision and testing of samples of materials and goods and/or of finishes and assemblies of elements of the works 4.2.5 Opening up of work for inspection, removal or re-execution [23.2.4; 26.4.2] 4.2.6 Removal or re-execution of work Carried Forward Bill No. 1 PRELIMINARIES		R	
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	Brought Forward 4.2.7 Removal or substitution of any materials and goods 4.2.8 Protection of the works 4.2.9 Making good physical loss and repairing damage to the works [23.2.2] 4.2.10 Rectification of defects [21.2] 4.2.11 A list for practical completion specifying outstanding or defective work to be rectified to achieve practical completion, a list for completion and a list for final completion specifying outstanding or defective work to be rectified to achieve final completion 4.2.12 Expenditure of budgetary allowances, prime cost amounts and provisional sums 5. <u>Wet services engineer</u> 5.1 Duties [6.2] : The wet services engineer is responsible for all aspects of wet services engineering design and quality inspection of the works 5.2 Contract instructions [6.2; 17.1] : 5.2.1 Rectification of discrepancies, errors in description or quantity or omission of items in the agreement other than in the JBCC Principal Building Agreement 5.2.2 Alteration to design, standards or quantity of the works provided that such contract instructions shall not substantially change the scope of the works 5.2.3 Compliance with the law, regulations and bylaws [2.1] 5.2.4 Provision and testing of samples of materials and goods and/or of finishes and assemblies of elements of the works Carried Forward Bill No. 1 PRELIMINARIES		R	
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	Brought Forward 5.2.5 Opening up of work for inspection, removal or re-execution [23.2.4; 26.4.2] 5.2.6 Removal or re-execution of work 5.2.7 Removal or substitution of any materials and goods 5.2.8 Protection of the works 5.2.9 Making good physical loss and repairing damage to the works [23.2.2] 5.2.10 Rectification of defects [21.2] 5.2.11 A list for practical completion specifying outstanding or defective work to be rectified to achieve practical completion, a list for completion and a list for final completion specifying outstanding or defective work to be rectified to achieve final completion 5.2.12 Expenditure of budgetary allowances, prime cost amounts and provisional sums 6. <u>Fire consultant</u> 6.1 Duties [6.2] : The fire consultant is responsible for all aspects of rational fire design and quality inspection of the works 6.2 Contract instructions [6.2; 17.1] : 6.2.1 Rectification of discrepancies, errors in description or quantity or omission of items in the agreement other than in the JBCC Principal Building Agreement 6.2.2 Alteration to design, standards or quantity of the works provided that such contract instructions shall not substantially change the scope of the works 6.2.3 Compliance with the law, regulations and bylaws [2.1] Carried Forward Bill No. 1 PRELIMINARIES			R	
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Brought Forward 6.2.4 Provision and testing of samples of materials and goods and/or of finishes and assemblies of elements of the works 6.2.5 Opening up of work for inspection, removal or re-execution [23.2.4; 26.4.2] 6.2.6 Removal or re-execution of work 6.2.7 Removal or substitution of any materials and goods 6.2.8 Protection of the works 6.2.9 Making good physical loss and repairing damage to the works [23.2.2] 6.2.10 Rectification of defects [21.2] 6.2.11 A list for practical completion specifying outstanding or defective work to be rectified to achieve practical completion, a list for completion and a list for final completion specifying outstanding or defective work to be rectified to achieve final completion 6.2.12 Expenditure of budgetary allowances, prime cost amounts and provisional sums 7. <u>Health and safety consultant</u> 7.1 Duties [6.2] : The health and safety consultant is responsible for all aspects of health and safety of the works. Without derogating from the generality thereof, the health and safety consultant will perform the following specific functions and duties in respect of the health and safety aspects of the works. He shall: 7.1.1 Act as the employer's agent in terms of the Construction Regulations issued in terms of the Occupational Health and Safety Act, 1993 as amended 7.1.2 Prepare and update the health and safety specification for the works		R	
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	7.1.3 Agree with the contractor the health and safety plan for the works				
	7.1.4 Carry out regular audits to ensure adherence to the safety plan and compliance with the act and regulations				
	7.1.5 Stop the execution of the works where the agreed specification or plan is not adhered to				
	F:..... V:..... T:.....	Item			
7	Clause 7.0 - Design responsibility				
	F:..... V:..... T:.....	Item			
	<u>Insurances and securities (A8-A11)</u>				
8	Clause 8.0 - Works risk				
	F:..... V:..... T:.....	Item			
9	Clause 9.0 - Indemnities				
	F:..... V:..... T:.....	Item			
10	Clause 10.0 - Insurances				
	F:..... V:..... T:.....	Item			
11	Clause 11.0 - Securities				
	Extension of waiver of lien				
	The contractor shall ensure that a waiver of lien is included in all subcontracts and that the works executed on the site are kept free of all liens and other encumbrances at all times [11.10]				
	F:..... V:..... T:.....	Item			
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	<u>Execution (A12 - A17)</u>			
12	Clause 12.0 - Obligations of the parties Office accommodation The contractor shall provide, maintain and remove on practical completion air conditioned office accommodation with suitable tables and chairs for meetings to be held on the site. Such offices shall be kept clean and fit for use at all times [12.2.18] Notice board The contractor shall erect in a position approved by the principal agent, maintain and remove on practical completion a notice board recommended by the South African Institute of Architects and as approved by the principal agent listing the names and logos of the employer, the contractor and the professional consultants. No subcontractor or supplier notice boards may be erected unless permission is granted by the principal agent for such notice boards to be erected [12.2.18] Statutory and other notices The contractor shall submit and/or comply with all statutory and other notices that may be required by any local or other authority in order not to cause any delay to the commencement of the works by the contractor. The contractor shall pay all deposits or fees in this regard It is, however, specifically recorded that the employer shall be responsible for the timeous approval of building plans by any local or other authorities and the payment of any fees or charges related thereto F:..... V:..... T:.....	Item		
13	Clause 13.0 - Setting out F:..... V:..... T:.....	Item		
14	Clause 14.0 - Nominated subcontractors			
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	F:..... V:..... T:.....	Item		
15	Clause 15.0 - Selected subcontractors			
	F:..... V:..... T:.....	Item		
16	Clause 16.0 - Direct contractors			
	Attendance on direct contractors			
	In respect of direct contractors the contractor shall:			
	1. Designate an area for the direct contractor to establish a temporary office and workshop and storage of equipment and materials			
	2. Allow the use of personnel welfare facilities, where provided			
	3. Provide water, lighting and single phase electric power to a position within 50m of the place where the direct contract work is to be carried out, other than fuel or power for commissioning of any installation			
	4. Permit the direct contractor to use erected scaffolding, hoisting facilities, etc provided by the contractor , in common with others having the like right, while it remains erected on the site [16.1]			
	F:..... V:..... T:.....	Item		
17	Clause 17.0 - Contract instructions			
	Site instructions			
	Instructions issued on site are to be recorded in a site instruction book which is to be supplied and maintained on site by the contractor			
	F:..... V:..... T:.....	Item		
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	<u>Completion (A18 - A24)</u>			
18	Clause 18.0 - Interim completion	N/A		
19	Clause 19.0 - Practical completion F:..... V:..... T:.....	Item		
20	Clause 20.0 - Completion in sections F:..... V:..... T:.....	Item		
21	Clause 21.0 - Defects liability period and final completion F:..... V:..... T:.....	Item		
22	Clause 22.0 - Latent defects liability period F:..... V:..... T:.....	Item		
23	Clause 23.0 - Revision of the date for practical completion Substitution of materials and goods The removal or substitution of any materials and goods which do not conform to the specification or the contract drawings shall not constitute grounds for the extension of the construction period nor for the adjustment of the contract value [17.1.8; 23.1 & 2] F:..... V:..... T:.....	Item		
24	Clause 24.0 - Penalty for late or non-completion F:..... V:..... T:.....	Item		
	<u>Payment (A25 - A27)</u>			
25	Clause 25.0 - Payment			
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	Brought Forward		R	
	Prices submitted Where prices are submitted by the contractor or subcontractor during the progress of the works in respect of contract instructions or in regard to a claim under the terms of this agreement and notwithstanding the fact that such prices may be used in an interim payment certificate, there is to be no presumption of acceptance. Should the principal agent wish to accept any such prices prior to the issue of the certificate of final completion, it shall be in writing F:..... V:..... T:.....	Item		
26	Clause 26.0 - Adjustment of the contract value and final account Fluctuations in costs All fluctuations in costs, with the exception of fluctuations in the rate of Value Added Tax, shall be for the account of the contractor [26.9.5] The employer reserves the right to omit such work without compensation to the contractor for loss of profit or any other loss which the contractor may suffer as a result of such omission Cost of claims All costs incurred by the contractor in the preparation of claims shall be borne by the contractor. This provision shall not preclude an adjudicator or an arbitrator appointed in terms of this agreement [30.6 & 7] from making a determination on costs Claims from subcontractors The contractor shall review, assess and adjudicate any claims received by him from any subcontractor and thereafter submit same to the principal agent with a recommendation in order to assist the principal agent in adjudicating the claim [26.6] F:..... V:..... T:.....	Item		
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27	Clause 27.0 - Recovery of expense and/or loss F:..... V:..... T:..... <u>Suspension and termination (A28 - A29)</u>	Item		
28	Clause 28.0 - Suspension by the contractor F:..... V:..... T:.....	Item		
29	Clause 29.0 - Termination F:..... V:..... T:..... <u>Dispute resolution (A30)</u>	Item		
30	Clause 30.0 - Dispute resolution F:..... V:..... T:.....	Item		
31	<u>Agreement</u> The required information of the parties and the amount of the contract sum shall be inserted in the agreement for signature of the agreement by the parties F:..... V:..... T:.....	Item		
32	<u>Contract data</u> Tenderer's selections Before submission of his tender the contractor is to complete the tenderer's selections in the contract data F:..... V:..... T:..... <u>SECTION B: GENERAL PRELIMINARIES</u>	Item		
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	<u>Definitions and interpretation (B1)</u>			
33	Clause 1.1 - Definitions F:..... V:..... T:.....	Item		
34	Clause 1.2 - Interpretation F:..... V:..... T:.....	Item		
	<u>Documents (B2)</u>			
35	Clause 2.1 - Checking of documents F:..... V:..... T:.....	Item		
36	Clause 2.2 - Provisional bills of quantities			
37	Clause 2.3 - Availability of construction information F:..... V:..... T:.....	Item		
38	Clause 2.4 - Ordering of materials and goods F:..... V:..... T:.....	Item		
	<u>Previous work and adjoining properties (B3)</u>			
39	Clause 3.1 - Previous work - dimensional accuracy F:..... V:..... T:.....	Item		
40	Clause 3.2 - Previous work - defects F:..... V:..... T:.....	Item		
41	Clause 3.3 - Inspection of adjoining properties F:..... V:..... T:.....	Item		
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	<u>The site (B4)</u>				
42	Clause 4.1 - Handover of site in stages F:..... V:..... T:.....	Item			
43	Clause 4.2 - Enclosure of the works F:..... V:..... T:.....	Item			
44	Clause 4.3 - Geotechnical and other investigations F:..... V:..... T:.....	Item			
45	Clause 4.4 - Encroachments F:..... V:..... T:.....	Item			
46	Clause 4.5 - Existing premises occupied F:..... V:..... T:.....	Item			
47	Clause 4.6 - Services - known F:..... V:..... T:.....	Item			
	<u>Management of contract (B5)</u>				
48	Clause 5.1 - Management of the works F:..... V:..... T:.....	Item			
49	Clause 5.2 - Progress meetings F:..... V:..... T:.....	Item			
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50	Clause 5.3 - Technical meetings F:..... V:..... T:..... <u>Samples, shop drawings and manufacturer's instructions (B6)</u>	Item			
51	Clause 6.1 - Samples of materials F:..... V:..... T:.....	Item			
52	Clause 6.2 - Workmanship samples F:..... V:..... T:.....	Item			
53	Clause 6.3 - Shop drawings F:..... V:..... T:.....	Item			
54	Clause 6.4 - Compliance with manufacturer's instructions F:..... V:..... T:..... <u>Deposits and fees (B7)</u>	Item			
55	Clause 7.1 - Deposits and fees F:..... V:..... T:..... <u>Temporary services (B8)</u>	Item			
56	Clause 8.1 - Water F:..... V:..... T:.....	Item			
57	Clause 8.2 - Electricity F:..... V:..... T:.....	Item			
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58	Clause 8.3 - Ablution and welfare facilities F:..... V:..... T:.....	Item			
59	Clause 8.4 - Communication facilities F:..... V:..... T:..... <u>Prime cost amounts (B9)</u>	Item			
60	Clause 9.1 - Responsibility for prime cost amounts F:..... V:..... T:..... <u>Attendance on subcontractors (B10)</u>	Item			
61	Clause 10.1 - General attendance F:..... V:..... T:.....	Item			
62	Clause 10.2 - Special attendance <u>General (B11)</u>				
63	Clause 11.1 - Protection of the works F:..... V:..... T:.....	Item			
64	Clause 11.2 - Protection/isolation of existing works and works occupied in sections F:..... V:..... T:.....	Item			
65	Clause 11.3 - Security of the works F:..... V:..... T:.....	Item			
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66	Clause 11.4 - Notice before covering work F:..... V:..... T:.....	Item			
67	Clause 11.5 - Disturbance Disturbance All work is to be carried out in such a manner as to cause no unacceptable or unreasonable dust, noise, vibrations, nuisance, inconvenience, annoyance and the like to the public, others, other properties and traffic in so far as they exceed the permissible limitations set by government legislation or by the local authority. Any delays, stoppages and the like arising from or in order to comply with the above will not constitute grounds for an adjustment to the construction period or contract value whatsoever F:..... V:.....T:.....	Item			
68	Clause 11.6 - Environmental disturbance Controlling all forms of pollution The contractor shall be responsible for and take all precautions in controlling by whatever means necessary all forms of pollution emanating from the site during the construction period due inter alia to noise, artificial light, wind-blown sand, dust, deposits of mud, etc The contractor is to ensure that all roads which border the site and are used by the contractor during the execution of the works are kept clean and free of any dirt or debris caused by the execution of the works				
69	Clause 11.7 - Works cleaning and clearing F:..... V:..... T:.....	Item			
70	Clause 11.8 - Vermin F:..... V:..... T:.....	Item			
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71	Clause 11.9 - Overhand work F:..... V:..... T:.....	Item		
72	Clause 11.10 - Tenant installations F:..... V:..... T:.....	Item		
73	Clause 11.11 - Advertising F:..... V:..... T:.....	Item		
	<u>SECTION C: SPECIFIC PRELIMINARIES</u>			
74	Warranties for materials and workmanship Where warranties for materials and/or workmanship are called for, the contractor shall obtain a written warranty, addressed to the employer, from the entity supplying the materials and/or executing the work and shall deliver same to the principal agent on final completion of the contract The warranty shall state that workmanship, materials and installation are warranted for a specific period from the date of practical completion and that any defects that may arise during the specified period shall be made good at the expense of the entity supplying the materials and/or doing the work, upon written notice to do so The warranty will not be enforced if the work is damaged by defects in the execution of the works, in which case the responsibility for replacement shall rest entirely with the contractor F:..... V:..... T:.....	Item		
	Carried Forward		R	
	Bill No. 1 PRELIMINARIES			

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	Brought Forward		R	
75	Overtime Should overtime be required to be worked for any reason whatsoever, the cost of such overtime is to be borne by the contractor unless the principal agent has specifically authorised, prior to execution thereof, that costs for such overtime are to be borne by the employer F:..... V:..... T:.....	Item		
76	Cooperation of the contractor for cost management It is specifically agreed that the contractor accepts the obligation of assisting the principal agent in implementing proper cost management. The contractor will be advised by the principal agent of all cost management procedures which will be implemented to ensure that the contract value does not exceed the budget F:..... V:..... T:.....	Item		
77	Overloading The contractor shall take all necessary steps to ensure that no damage occurs due to overloading of any portion of the works or temporary works e.g. scaffolding, etc. The contractor shall submit details of his proposed loading, storage, plant erection, etc to the principal agent for approval prior to proceeding with such loading, storing or erecting and shall comply with and pay for the principal agent's requirements in connection with the provision of temporary support work, etc. Any damage caused to the works by overloading shall be made good by the contractor at his sole expense F:..... V:..... T:.....	Item		
	Carried Forward		R	
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	Brought Forward 78 Propping of floors below The contractor is advised that propping of floors below may be required if he wishes to use any areas of completed suspended reinforced concrete slabs for vehicle access, storage of materials and goods and location of plant, scaffolding, etc. The location of these areas and any necessary propping shall be approved by the principal agent and the cost thereof shall be borne by the contractor F:..... V:..... T:..... Health and safety Without limiting the generality of the provisions of clause 2.0, the contractor's attention is drawn to the provisions of the Construction Regulations issued in terms of the Occupational Health and Safety Act, 1993 as amended. It is specifically stated that the employer shall prepare a documented health and safety specification for the works (annexed to these bills of quantities) and that the employer shall ensure that the contractor has made provision for the cost of health and safety measures during the execution of the works. The contractor shall price opposite this item for compliance with the act and the regulations and the provisions of the aforementioned health and safety specification [2.1] The contractor shall: 1. Comply with the health and safety specification for the works 2. Prepare and agree with the health and safety consultant the health and safety plan for the works 3. Cooperate with the health and safety consultant in all respects 4. Manage the compliance of all subcontractors with the regulations and with the health and safety plan and specification 5. Conform to the conditions contained in the employer's health and safety specification F:..... V:..... T:..... Carried Forward Bill No. 1 PRELIMINARIES	Item Item	R R	
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	Brought Forward		R	
79	Green star building certification F:..... V:.....T:.....	Item		
80	Broad based black economic empowerment (BBBEE) Tenders submitted will be evaluated taking into account their empowerment rating The employer will be monitoring the broad based black economic empowerment (BBBEE) status of the contractor throughout the execution of the works The contractor is to submit to the principal agent on an annual basis a schedule of spend, split into vendors engaged as subcontractors and suppliers indicating their BBBEE rating including proof of the said rating F:..... V:.....T:.....	Item		
81	Advertising rights The employer may elect to contract with advertising agencies for the erection of advertising hoardings, banners, wraps or the like for the duration of the contract. The contractor shall not prevent such an arrangement and will assist in the facilitation of same. The position and type of advertising structure to be agreed with the principal agent so as not to hinder the contractor in meeting his obligations under this agreement F:..... V:.....T:.....	Item		
82	Confidentiality The contractor undertakes to maintain in confidence any and all information regarding this project and shall obtain appropriate similar undertakings from all subcontractors and suppliers. Such information shall not be used in any way except in connection with the execution of the works No information regarding this project shall be published or disclosed without the prior written consent of the employer F:..... V:.....T:.....	Item		
	Carried Forward		R	
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83	Brought Forward Media releases All rights of publication of articles in the media, together with any advertising relating thereto or in any way connected with this project, shall vest with the employer The contractor together with his subcontractors shall not, without the prior written consent of the employer, cause any statement or advertisement connected with this project to be printed, screened or aired by the media F:..... V:.....T:..... <u>SUMMARY OF CATEGORIES</u> Category : Fixed R..... Category : Value R..... Category : Time R..... Carried to Summary Bill No. 1 PRELIMINARIES	Item	R	
			R	

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Item No		Quantity	Rate	Amount
	<u>BILL NO. 2</u> <u>ALTERATIONS (PROVISIONAL)</u> <u>View site</u> Before submitting his tender the tenderer shall visit the site and satisfy himself as to the nature and extent of the work to be done and the value of the materials salvageable from the alterations. No claim for any variations of the contract sum in respect of the nature and extent of the work or of inferior or damaged materials will be entertained <u>General</u> The contractor shall carry out the whole of the works with as little mess and noise as possible and with a minimum of disturbance to tenants in the building and to adjoining premises and their tenants. He shall provide proper protection and provide, erect and remove when directed, any temporary tarpaulins that may be necessary during the progress of the works, all to the satisfaction of the principal agent Making good of finishes shall include making good of the brick and concrete surfaces onto which the new finishes are applied, where necessary The contractor will be required to take all dimensions affecting the existing buildings on the site and he will be held solely responsible for the accuracy of all such dimensions where used in the manufacture of new items (doors, windows, fittings, etc) <u>TEMPORARY BARRICADES, SCREENS, ETC</u> <u>Temporary barricades, screens, roofs, etc including removal upon completion of the works</u>			
1	Drywall barricade 3m high of galvanised steel channel section rails and studs covered on one side with 12,7mm gypsum plasterboard and finished with two coats interior quality PVA emulsion paint, including corners, ends, etc	m	30	
	Carried Forward Bill No. 2 ALTERATIONS		R	

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	Brought Forward			R	
2	Extra over preceding item for hollow core single door 813 x 2032mm high, including steel frame, two-lever mortice lock, primer and two coats paint	No	2		
3	Shutterboard protective covering over tiled floors (portion of lobby area).	m2	300		
	<u>REMOVAL OF EXISTING WORK</u>				
	<u>Breaking down and removing brickwork etc</u>				
4	Half brick walls	m2	41		
	<u>Taking out and removing doors, windows, etc, including thresholds, sills, etc (building up openings and making good finishes elsewhere)</u>				
5	Timber single door and frame not exceeding 2,5m ²	No	16		
6	Timber double door and frame exceeding 2,5m ² and not exceeding 5m ²	No	2		
	<u>Taking down and removing roofs, floors, panelling, ceilings, partitions, etc</u>				
7	Gypsum plasterboard ceilings, including timber bandering, cornices, etc	m2	1,387		
8	Acoustic tile suspended ceilings, including suspension grid, hangers, cornices, etc	m2	1,313		
9	Drywall partitions 3m high, including doors, glazed borrowed lights, etc	m	282		
	<u>Taking out and removing sundry joinery work, fittings, etc</u>				
10	Timber skirtings	m	1,256		
	<u>Taking up and removing wood block floor coverings, vinyl floor coverings, carpets, etc and preparing screeds for new floor coverings</u>				
11	Carpet tile floor covering	m2	1,210		
	Carried Forward			R	
	Bill No. 2 ALTERATIONS				

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	Brought Forward			R	
	<u>Taking out and removing ironmongery</u>				
12	Mortice lockset from timber door	No	4		
13	Door closer from timber door and frame	No	4		
	<u>Hacking up/off and removing ceramic tiles including removing mortar bed or adhesive from concrete or brickwork and preparing surfaces for new screed, plaster, tile finish, etc</u>				
14	Tiles to floors	m2	741		
15	Tiles to treads and risers of stairs	m2	20		
16	Tiles to walls	m2	144		
17	Tile skirtings 100mm high	m	1,056		
	<u>Taking out and removing sundry joinery work, fittings, etc, setting aside for re-use and later refixing in similar new position</u>				
18	Timber wall cupboard 3 000 x 600 x 600mm high (first floor pause area 1)	No	1		
19	Timber wall cupboard 5 000 x 600 x 600mm high (first floor pause area 2)	No	1		
20	Timber floor cupboard 1500 x 600 x 900mm high (canteen)	No	1		
21	Timber floor cupboard 1 500 x 600 x 900mm high, including sink and disconnecting waste pipe (canteen)	No	1		
22	L-shaped timber sink cupboard 6 300 x 600 x 900mm high, including sink and disconnecting waste pipe (ground floor tea kitchen)	No	1		
23	Timber sink cupboard 2 200 x 600 x 900mm high, including sink and disconnecting waste pipe (canteen)	No	1		
24	Timber sink cupboard 3 000 x 600 x 900mm high, including sink and disconnecting waste pipe (first floor pause area 1)	No	1		
	Carried Forward			R	
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Brought Forward			R	
25	Timber sink cupboard 5 000 x 600 x 900mm high, including prep bowl and disconnecting waste pipe (canteen)	No	1	
26	Curved timber counter approximately 3 000 x 700 x 1200mm high (canteen)	No	1	
27	L-shaped timber counter approximately 6 500 x 700 x 1200mm high (canteen)	No	1	
28	Curved timber counter approximately 8 700 x 750 x 1200mm high (reception)	No	1	
<u>Taking out and removing sanitary fittings, tanks, geysers, etc, including disconnecting from pipes, traps, etc and making good floor and wall finishes (making good tiling and paintwork elsewhere)</u>				
29	Vitreous china WC pan with flush valve and flush pipe	No	14	
30	Vitreous china wall hung urinal with flush valve and flush pipe	No	4	
31	Vitreous china wash hand basin	No	12	
<u>Taking out/off and removing glass and mirrors</u>				
32	Mirror 2 000 x 1 000mm high from wall	No	4	
<u>CUTTING THROUGH FLOORS AND CEILINGS</u>				
<u>Cutting through:</u>				
33	100mm Thick unreinforced concrete surface bed for 230mm wide concrete wall footings and making good concrete on both sides of new one brick walls (making good floor finishes elsewhere)	m	8	
34	100mm Thick unreinforced concrete surface bed for 110mm external diameter pipe and making good concrete (making good floor finishes elsewhere)	m	14	
<u>OPENINGS THROUGH EXISTING WALLS, FLOORS, ETC</u>				
Carried Forward			R	
Bill No. 2 ALTERATIONS				

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	Brought Forward			R	
	<u>Core drilling:</u>				
35	Core drilling through 200mm thick reinforced concrete floor for opening size 250 x 250mm opening	No	4		
36	Core drilling through 200mm thick reinforced concrete floor for opening size 110mm diameter opening	No	4		
	<u>MAKING GOOD OF FINISHES ETC</u>				
	<u>Substrate to be clean, mechanically sound and free of laitance, dust grease and oil. Prime substrate with one coat "FloorworX No. 33" or similar approved bonding liquid using a sheepskin roller or broom at a spreadrate of 10m²/litre. Mechanically mix "Pavelite" or similar approved smoothing compound with clean water until a homogenous mix has been achieved. Apply 2 to 4mm thick "Pavelite" or similar approved smoothing compound using a flat steel plaster trowel, all in accordance with the manufacturer's instructions.</u>				
37	On floors	m2	2,308		
	<u>Making good walls</u>				
38	Walls in patches with internal cement plaster	m2	80		
39	Walls in patches with internal two coat plaster with gypsum finish	m2	28		
	<u>NEW WORK CHIEFLY INSIDE EXISTING BUILDING(S)</u>				
	<u>Masonry</u>				
40	Cutting toothings to bond new brickwork to existing brickwork	m2	3		
41	Half brick walls	m2	14		
42	One coat cement plaster to brick walls	m2	14		
	<u>BUDGETARY ALLOWANCES</u>				
	Carried Forward			R	
	Bill No. 2 ALTERATIONS				

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[illegible]

Item No		Quantity	Rate	Amount
	<u>BILL NO 3</u> <u>CEILINGS, PARTITIONS AND ACCESS FLOORING (PROVISIONAL)</u> Tenderers are referred to the "General Preambles for Trades" (2017 Edition) as published by the Association of South African Quantity Surveyors (ASAQS). <u>SUPPLEMENTARY PREAMBLES</u> <u>Descriptions</u> Items described as "nailed" shall be deemed to be fixed with hardened steel nails or pins or shot pinned to masonry or concrete Items described as "plugged" shall be deemed to include screwing to fibre, plastic or metal plugs at not exceeding 600mm centres, and where described as "bolted", the bolts are measured elsewhere <u>Proprietary suspended ceilings</u> Electrical light fittings, diffusers, panels, etc generally are "lay in" units of the same dimensions as the suspension grid described and allowance must be made accordingly for their support inclusive of any flexibility in setting out that may be required (ceiling panels have not been deducted and pricing is to take cognizance thereof) <u>Flush margins and borders</u> Flush margins and borders not exceeding 1.20m wide of materials differing from the general ceiling material are given in metres separating into groups in successive widths of 300mm <u>Bulkheads</u> Bulkheads are those areas of ceilings which occur at a level differing from the general ceiling level or plane. Their function is to conceal services, or merely to create an architectural feature			
	Carried Forward Bill No. 3 CEILINGS, PARTITIONS AND ACCESS FLOORING		R	

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	Bulkheads will only be measured as such when they conform with the above description and when the horizontal or vertical dimensions do not exceed 1.20m. Where these dimensions exceed 1.20m the horizontal or vertical ceilings are included in the general ceiling measurements <u>SUSPENDED CEILINGS</u> <u>1200 x 600 x 16mm pre-painted acoustic panels (Class D) on exposed suspension grid system including hangers, necessary hold-down clips and wedges, etc</u>				
1	Ceilings suspended not exceeding 1m below concrete soffits m2 212				
	<u>600 x 600 x 12,5mm pre-painted acoustic panels (Class D) on exposed suspension grid system including hangers, necessary hold-down clips and wedges, etc</u>				
2	Ceilings suspended not exceeding 1m below concrete soffits m2 1,225				
	<u>1 200 x 200 x 40mm "Owa Freestyle" or similar approved baffles, in accordance with manufacturer's instructions</u>				
3	Ceilings suspended not exceeding 1m below concrete soffits m2 24				
	<u>9.5mm Taper edge gypsum plasterboard screwed to and including screw-up suspension system with tape over joints and the whole finished with gypsum skim plaster trowelled to a smooth polished surface</u>				
4	Horizontal ceilings suspended not exceeding 1m below concrete soffits m2 170				
5	Margins not exceeding 250mm wide around lay-in panel ceilings, suspended not exceeding 1m below concrete soffits m 1,153				
6	Margins 250mm to not exceeding 500mm wide around lay-in panel ceilings, suspended not exceeding 1m below concrete soffits m 1,231				
	Carried Forward			R	
	Bill No. 3 CEILINGS, PARTITIONS AND ACCESS FLOORING				

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7	Margins 500mm to not exceeding 750mm wide around lay-in panel ceilings, suspended not exceeding 1m below concrete soffits	m	178		
8	Margins 750mm to 1 000mm wide around lay-in panel ceilings, suspended not exceeding 1m below concrete soffits	m	32		
9	Vertical bulkheads 445mm high, suspended not exceeding 1m below concrete soffits	m	15		
	<u>Sawn softwood</u>				
10	28 x 38mm SA Pine ceiling joists at 67mm centres suspended from soffit	m2	24		
	<u>Cornices, perimeter trims, etc to suspended ceilings</u>				
11	Transition between different ceilings finishes	m	1,643		
12	75mm Plasterboard cornices, plugged	m	1,721		
	<u>PARTITIONS ETC</u>				
	<u>DRYWALL PARTITIONS</u>				
	<u>SUPPLEMENTARY PREAMBLES</u>				
	Partitions consisting of 48mm 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				
	<u>Plasterboard partitions with 12,5mm thick board cladding on both sides, installed in accordance with manufacturer's instructions (sound rating 41dB)</u>				
13	Partitions 3m high with bottom and top tracks plugged	m	140		
14	Extra over partition 3m high for vertical abutment	No	6		
15	Extra over partition 3m high for corner	No	7		
16	Extra over partition 3m high for T-intersection	No	3		
	Carried Forward			R	
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17	Extra over partition 3m high for fair end	No	3		
	<u>Sound resistant partitions consisting of 15mm thick outer layer and 15m thick inner layer on either side, filled in with 102mm thick glasswool insulation in blanket form, installed in accordance with manufacturer's instructions (sound rating - 71dB)</u>				
18	Partitions 3m high with bottom and top tracks plugged	m	93		
19	Extra over partition 3m high for vertical abutment	No	3		
20	Extra over partition 3m high for corner	No	9		
21	Extra over partition 3m high for T-intersection	No	9		
22	Extra over partition 3m high for fair end	No	1		
	<u>Extra over plasterboard 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 pressed steel door frame with one pair of 100mm steel hinges to each hanging stile, including additional studding, trimming, etc. to partitions</u>				
23	Double door 1 510 x 2 030mm high including lockset (Door Type DT-01)	No	13		
24	Door 815 x 2 030mm high including lockset (Door Type DT-02)	No	13		
25	Door 815 x 2 030mm high including glazed panel and lockset (Door Type DT-03)	No	12		
	<u>GLAZED SHOPFRONT PARTITIONS</u>				
	<u>Powder-coated aluminium internal shopfronts and doors glazed with 6.38mm thick toughened clear safety glass, including ironmongery</u>				
26	Partition 2 285mm x 2 500m high including single glazed door 900 x 2100mm high (Refer to Type SFi-01 Elevation on Drawing AR/ 5001/ A)	No	1		
27	Partition 4 400mm x 2 500m high including single glazed door 900 x 2100mm high (Refer to Type SFi-02 Elevation on Drawing AR/ 5001/ A)	No	1		
	Carried Forward			R	
	Bill No. 3 CEILINGS, PARTITIONS AND ACCESS FLOORING				

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	Brought Forward			R	
28	Partition 2 210mm x 2 500m high including single glazed door 900 x 2100mm high (Refer to Type SFi-03 Elevation on Drawing AR/ 5001/ A)	No	1		
29	Partition 5 555mm x 2 500m high including single glazed door 900 x 2100mm high (Refer to Type SFi-04 Elevation on Drawing AR/ 5001/ A)	No	1		
30	Partition 1 375mm x 2 500m high including single glazed door 805 x 2 100mm high (Refer to Type SFi-05 Elevation on Drawing AR/ 5001/ A)	No	1		
31	Partition 2 430mm x 2 500m high (Refer to Type SFi-06 Elevation on Drawing AR/ 5001/ A)	No	1		
32	Partition 2 600mm x 2 500m high including single glazed door 900 x 2 100mm high (Refer to Type SFi-07 Elevation on Drawing AR/ 5002/ A)	No	1		
33	Partition 3 740mm x 2 500m high (Refer to Type SFi-08 Elevation on Drawing AR/ 5002/ A)	No	1		
34	Partition 2 600mm x 2 500m high including single glazed door 900 x 2 100mm high (Refer to Type SFi-09 Elevation on Drawing AR/ 5002/ A)	No	1		
35	Partition 4 070mm x 2 500m high including single glazed door 900 x 2 100mm high (Refer to Type SFi-10 Elevation on Drawing AR/ 5002/ A)	No	1		
36	Partition 4 210mm x 2 500m high including single glazed door 900 x 2 100mm high (Refer to Type SFi-11 Elevation on Drawing AR/ 5002/ A)	No	1		
37	Partition 1 645mm x 2 500m high including single glazed door 900 x 2 100mm high (Refer to Type SFi-12 Elevation on Drawing AR/ 5002/ A)	No	1		
38	Partition 8 545mm x 2 500m high including single glazed door 900 x 2 100mm high (Refer to Type SFi-13 Elevation on Drawing AR/ 5003/ A)	No	1		
39	Partition 1 310mm x 2 500m high including single glazed door 900 x 2 100mm high (Refer to Type SFi-14 Elevation on Drawing AR/ 5003/ A)	No	1		
	Carried Forward			R	
	Bill No. 3 CEILINGS, PARTITIONS AND ACCESS FLOORING				

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	Brought Forward			R	
40	Partition 1 930mm x 2 500m high including single glazed door 900 x 2 100mm high (Refer to Type SFi-15 Elevation on Drawing AR/ 5003/ A)	No	1		
41	Partition 3 255mm x 2 500m high including single glazed door 900 x 2 100mm high (Refer to Type SFi-16 Elevation on Drawing AR/ 5003/ A)	No	1		
42	Partition 3 345mm x 2 500m high including single glazed door 900 x 2 100mm high (Refer to Type SFi-17 Elevation on Drawing AR/ 5003/ A)	No	1		
43	Partition 2 480mm x 2 500m high including single glazed door 900 x 2 100mm high (Refer to Type SFi-18 Elevation on Drawing AR/ 5004/ A)	No	1		
44	Partition 7 325mm x 2 500m high including single glazed door 900 x 2 100mm high (Refer to Type SFi-19 Elevation on Drawing AR/ 5004/ A)	No	1		
45	Partition 1 995mm x 2 500m (Refer to Type SFi-20 Elevation on Drawing AR/ 5004/ A)	No	1		
46	Partition 1 960mm x 2 500m including single glazed door 900 x 2 100mm high (Refer to Type SFi-21 Elevation on Drawing AR/ 5004/ A)	No	1		
47	Partition 1 005mm x 2 500m (Refer to Type SFi-22 Elevation on Drawing AR/ 5004/ A)	No	1		
48	Partition 1 675mm x 2 500m including single glazed door (Refer to Type SFi-23 Elevation on Drawing AR/ 5004/ A)	No	1		
49	Partition 2 820mm x 2 500m including single glazed door 900 x 2 100mm high (Refer to Type SFi-24 Elevation on Drawing AR/ 5004/ A)	No	1		
50	Partition 2 415mm x 2 500m high including single glazed door 900 x 2 100mm high (Refer to Type SFi-25 Elevation on Drawing AR/ 5005/ A)	No	1		
51	Partition 2 415mm x 2 500m high including single glazed door 900 x 2 100mm high (Refer to Type SFi-26 Elevation on Drawing AR/ 5005/ A)	No	1		
	Carried Forward			R	
	Bill No. 3 CEILINGS, PARTITIONS AND ACCESS FLOORING				

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52	Brought Forward			R	
	Partition 2 920mm x 2 500m high including single glazed door 900 x 2 100mm high (Refer to Type SFi-27 Elevation on Drawing AR/ 5005/ A)	No	1		
	Carried to Summary			R	
	Bill No. 3 CEILINGS, PARTITIONS AND ACCESS FLOORING				

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Item No		Quantity	Rate	Amount
	<u>BILL NO 4</u> <u>CARPENTRY AND JOINERY</u> <u>(PROVISIONAL)</u> Tenderers are referred to the "General Preambles for Trades" (2017 Edition) as published by the Association of South African Quantity Surveyors (ASAQS). <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>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>FLOORS AND SKIRTINGS</u> <u>SKIRTINGS</u> <u>Medium density fibre-board (MDF)</u>			
1	15 x 100mm Skirtings	m	150	
	<u>PANELLING</u> <u>Timber wall panelling</u>			
2	Slatted panelling of 22mm thick x 32mm wide vertical solid oak slats at 25mm centres pinned to 16mm medium-density fibre backing board (backing board with and including oak veneer to all exposed edges)	m2	179	
	<u>NOTICEBOARDS, KEYBOARDS, DUCKBOARDS, ETC</u>			
	Carried Forward Bill No. 4 CARPENTRY AND JOINERY		R	

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	Brought Forward			R	
	<u>Magnetic boards</u>				
3	Whiteboard 2000mm x 1200mm high overall, plugged	No	10		
	<u>FITTINGS</u>				
	<u>CUPBOARDS TO KITCHENS, BEDROOMS, ETC</u>				
	<u>SUPPLEMENTARY PREAMBLES</u>				
	<u>General</u>				
	The following joinery 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 drawings annexed to these bills of quantities for tender purposes				
	<u>Counters</u>				
4	Reception desk 3 910 x 1 000mm high with top, sides, bottom, division, shelf, back, three 600mm wide drawers on either end, granite counter tops and laser-cut engraving to front (complete as per Drawing AR/1016/ Revision A)	No	1		
5	Floating coffee station 2 000mm long x 600mm wide formed of 16mm melamine carcass faced with 16mm timber look melamine board including marble top, complete as per Drawing AR/ 1017/ Revision A (conference room)	No	1		
6	Counter 5 000mm long x 600mm x 1300mm high overall complete as per Drawing AR/1018/ Revision A (business lounge)	No	1		
	Carried Forward			R	
	Bill No. 4 CARPENTRY AND JOINERY				

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	Brought Forward			R	
7	Counter 5 000mm long x 600mm x 1300mm high overall, including 1 200mm wide cupboard with double doors on one end, 50 x 50mm mild steel square tube sub-frame, complete as per Drawing AR /1021/ Revision A (pause area)	No	1		
8	Floating kiaat wood table 1 860mm long x 600mm wide, fixed at 750mm high, including mild steel hollow core tube, complete as per Drawing AR/ 1020/ Revision A (private booth)	No	1		
9	Floating kiaat wood desk 2 515mm long x 750mm wide, fixed at 750mm high, including mild steel hollow core tube, complete as per Drawing AR/ 1020/ Revision A (private booth)	No	1		
10	Floating wall table 1 655mm long x 600mm wide, fixed at 900mm high, complete as per Drawing AR/1020/ Revision A (pause area)	No	1		
	<u>Vanity counter</u>				
11	Vanity counter with quartz counter-top, 2 400mm long x 600mm high, fixed at 900mm high, including 36 x 36mm mild steel square hollow section sub-frame, complete as per Drawing AR/ 1022/ Revision A (ablutions - basins elsewhere)	No	4		
	<u>Seating</u>				
12	Booth seating 4 540mm long x 625mm wide x 885mm high including waLnut timber bench, 38 x 38mm pine battens, 16mm medium-density fibre board ribs, complete as per Drawing AR/ 1017/ Revision A (community space)	No	1		
13	Booth seating 4 625mm long x 1 010mm wide x 1200mm high including walnut timber bench, 38 x 38mm pine battens, 16mm medium-density fibre board ribs, ceramic tiling to front, planter box, seating, complete as per Drawing AR/ 1019/ Revision A (reception)	No	1		
14	L-shaped booth seating 7 000mm long x 1 200mm wide x 895mm high overall including walnut timber bench, 38 x 38mm pine battens, 16mm medium-density fibre board ribs, ceramic tiling to front and back, planter box, seating, complete as per Drawing AR/ 1021/ Revision A (creative space)	No	1		
	Carried Forward			R	
	Bill No. 4 CARPENTRY AND JOINERY				

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	Brought Forward			R	
	<u>Kitchen cupboards</u>				
15	Floor cupboard 4 775mm long x 610mm wide x 900mm high with top, sides, bottom, division, shelves, back, drawers, doors, quartz countertop and necessary framework (Community Area - complete as per Drawing A/1018/ Revision A)	No	1		
16	Floor cupboard 3 420mm long x 610mm wide x 900mm high with top, sides, bottom, divisions, shelves, back, drawers, doors, quartz countertop and necessary framework - complete as per Drawing A/1019/ Revision A (COO's cupboard)	No	1		
17	Floor cupboard 2 445mm long x 610mm wide x 900mm high with top, sides, bottom, divisions, shelves, back, drawers, doors, quartz countertop and necessary framework - complete as per Drawing A/1019/ Revision A (CEO's cupboard)	No	1		
	<u>BLINDS</u>				
	<u>Roller blind with straight lower edge, aluminium roller and side controlled chain system with automatic clutch mechanism remote control motorised operated blinds to be fitted inside reveal to concrete lintel, installed in accordance with manufacturer's instructions.</u>				
18	Roller blind for window size 1 100 x 1 100mm high	No	92		
19	Roller blind for window size 2 400 x 2 100mm high	No	4		
20	Roller blind for window size 2 800 x 2 100mm high	No	10		
	Carried to Summary			R	
	Bill No. 4 CARPENTRY AND JOINERY				

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Item No		Quantity	Rate	Amount
	<u>BILL NO 4</u>			
	<u>FLOOR COVERINGS, WALL LININGS, ETC (PROVISIONAL)</u>			
	Tenderers are referred to the "General Preambles for Trades" (2017 Edition) as published by the Association of South African Quantity Surveyors (ASAQS).			
	Tenderers are referred to Drawings 2424-1006-SK-Rev A- (Floor Finishes Plan Ground Floor) and 2424-10007-2K-Rev A (Floor Finishes Plan First Floor)			
	<u>FLOOR COVERINGS</u>			
	<u>500 x 500mm commercial carpet tiles, installed by approved installer in accordance with SANS 10186:2010, the code of practice for textile floor coverings (Ref FF2)</u>			
1	On floors	m2	65	
	<u>500 x 500mm commercial carpet tiles, installed by approved installer in accordance with SANS 10186:2010, the code of practice for textile floor coverings (Ref FF3)</u>			
2	On floors	m2	640	
	<u>500 x 500mm commercial carpet tiles, installed by approved installer in accordance with SANS 10186:2010, the code of practice for textile floor coverings (Ref FF6)</u>			
3	On floors	m2	200	
	<u>500 x 500mm commercial carpet tiles, installed by approved installer in accordance with SANS 10186:2010, the code of practice for textile floor coverings (Ref FF9)</u>			
4	On floors	m2	438	
	Carried Forward			
	Bill No. 5 FLOOR COVERINGS, WALL LININGS, ETC			
			R	

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		Brought Forward			R	
		<u>Luxury woodplank vinyl floor tiles size 184 x 1219 x 2,0mm thick, with a 0,55mm clear wear layer laid in an approved adhesive spread with a notched trowel on suitably prepared cement screed with a hygrometer reading showing a moisture content of less than 70% and rolled with 68kg articulated floor roller, all in accordance with manufacturer's recommendations (Ref FF4 - Belgotex or similar approved)</u>				
5	On floors	m2	460			
		<u>2mm thick vinyl floor sheeting, laid in conductive acrylic adhesive spread with a notched trowel on suitably prepared cement screed with a hygrometer reading showing a moisture content of less than 70%, with joints welded with a fully flexible welding rod to provide a smooth, hygienic sealed finish and rolled with 68kg articulated floor roller, all in accordance with manufacturer's recommendations (Ref FF5 - Belgotex Marmoreo or similar approved)</u>				
6	On floors	m2	50			
		<u>2mm thick vinyl floor sheeting, laid in conductive acrylic adhesive spread with a notched trowel on suitably prepared cement screed with a hygrometer reading showing a moisture content of less than 70%, with joints welded with a fully flexible welding rod to provide a smooth, hygienic sealed finish and rolled with 68kg articulated floor roller, all in accordance with manufacturer's recommendations (Ref FF7 - Belgotex Fango or similar approved)</u>				
7	On floors	m2	86			
		Carried Forward			R	
	Bill No. 5 FLOOR COVERINGS, WALL LININGS, ETC					

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	Brought Forward			R	
	<u>2mm thick vinyl floor sheeting, laid in conductive acrylic adhesive spread with a notched trowel on suitably prepared cement screed with a hygrometer reading showing a moisture content of less than 70%, with joints welded with a fully flexible welding rod to provide a smooth, hygienic sealed finish and rolled with 68kg articulated floor roller, all in accordance with manufacturer's recommendations (Ref FF8 - Belgotex Sagres T99 or similar approved)</u>				
8	On floors	m2	108		
	<u>SKIRTINGS, NOSINGS, ETC</u>				
	<u>Aluminium skirtings, nosings, etc</u>				
9	100mm natural anodised skirtings (Type A)	m	818		
	<u>POLISH, SEALERS, ETC</u>				
	<u>Two coats polish on vinyl flooring</u>				
10	On floors	m2	704		
	<u>MATS</u>				
	<u>Entrance mat</u>				
11	Black microfibre doormat entrance mat, overall size 900mm x 1 500mm x 8mm gauge, consisting of Microfibre, loose laid with PVC edging, installed in accordance with the manufacturer's recommendations.	No	1		
	Carried to Summary			R	
	Bill No. 5 FLOOR COVERINGS, WALL LININGS, ETC				

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Item No	Quantity	Rate	Amount
<u>BILL NO 5</u>			
<u>IRONMONGERY (PROVISIONAL)</u>			
<u>PHOTOLUMINESCENT SIGNS</u>			
<u>SUPPLEMENTARY PREAMBLES</u>			
Signs are to comply with SANS 1186-1 to 5 and to be to the approval of the local authority. Signs are to have anodised aluminium frames			
Prices are to include for fixing by approved methods. The use of double sided tape will not be permitted. Surface mounted signs are to be concealed fixed and ceiling mounted signs are to be hung with 2mm diameter stainless steel cables			
Single sided ceiling mounted signs are to have 2mm satin chrome anodised aluminium back panels			
Samples, specifications, literature, etc of materials and fabricated articles the tenderer proposes to use shall be submitted with the tender			
A ten year guarantee on materials and workmanship shall be submitted by the successful tenderer			
<u>Wall mounted photoluminescent statutory signs in 150 x 150mm modules</u>			
1	150 x 150mm Sign with one pictogram	No 20	
2	300 x 150mm Sign with two pictograms	No 11	
3	300 x 150mm Sign with EXIT sign	No 21	
4	450 x 150mm Sign with three pictograms	No 6	
5	600 x 150mm Sign with four pictograms	No 15	
<u>BATHROOM FITTINGS</u>			
Carried Forward			R
Bill No. 6 IRONMONGERY			

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Item No	Quantity	Rate	Amount
<u>BILL NO 6</u>			
<u>TILING (PROVISIONAL)</u>			
Tenderers are referred to the "General Preambles for Trades" (2017 Edition) as published by the Association of South African Quantity Surveyors (ASAQS).			
<u>Patterns</u>			
Unless otherwise described, tiles shall be laid with continuous joints in both directions			
<u>Fixing</u>			
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 as recommended by the manufacturer of the tiles			
<u>WALL TILING</u>			
<u>200 x 200mm Matt ceramic tiles on brickwork including cement plaster backing (PC =R230/m2)</u>			
1	On walls (ablutions)	m2	144
2	On narrow widths not exceeding 300mm	m2	3
<u>75 x 300 x 8mm Ceramic tiles (PC R 300/m²) fixed with adhesive to plaster (plaster elsewhere) and flush pointed with tinted grout</u>			
3	Listello tile on walls, 150mm high	m	52
Carried Forward			R
Bill No. 7 TILING			

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	Brought Forward			R	
	<u>100 x 200 x 8mm Glazed ceramic tiles (PC R 270/m²)</u> <u>fixed with adhesive to plaster (plaster elsewhere) and</u> <u>flush pointed with tinted grout</u>				
4	On walls in splashbacks (kitchen and pause areas)	m2	10		
	<u>FLOOR TILING</u>				
	<u>600 x 1200 x 10mm porcelain floor tiles (PC R 350/m²)</u> <u>fixed with adhesive to screed (screed elsewhere) and</u> <u>flush pointed with grout (Ref FF1)</u>				
5	On floors and landings	m2	534		
6	On risers 170mm high	m	35		
7	On treads 220mm wide	m	35		
8	Skirting 100mm high	m	167		
9	Skirting 100mm high stepped over treads and risers	m	9		
	<u>SUNDRIES</u>				
	<u>Aluminium dividing strips between different floor finishes</u>				
10	3 x 10mm formable square edge dividing strips between tiles	m	254		
	<u>Aluminium corner protectors, stair nosings, expansion joint strips, etc</u>				
11	Interior retro-fit aluminium corner protector in Matt Silver finish, size 25 x 25mm on ceramic tile surface, fixed to substrate with self-adhesive backing	m	18		
12	30 x 20mm high stair nosings	m	35		
13	46 x 8mm high movement joint strips fixed to substrate in accordance with manufacturer's recommendations	m	108		
	Carried to Summary			R	
	Bill No. 7 TILING				

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Item No		Quantity	Rate	Amount
	<u>BILL NO 7</u> <u>PAINTWORK (PROVISIONAL)</u> Tenderers are referred to the "General Preambles for Trades" (2017 Edition) as published by the Association of South African Quantity Surveyors (ASAQS). <u>SUPPLEMENTARY PREAMBLES</u> <u>DESCRIPTIONS</u> Descriptions of paintwork shall be deemed to include for all cutting in <u>PAINT SPECIFICATIONS</u> PREPARATORY WORK TO EXISTING SURFACES Plaster or concrete surfaces Surfaces shall be thoroughly cleaned down by high pressure water jet and allowed to dry completely before any paint is applied. Blistered or peeling paint shall be completely removed. All existing walls to be made good where damaged by removals, furniture, etc, and all screw and nail holes and cracks shall be opened, primed with plaster primer, filled with a suitable filler and finished smooth All painting shall be done in accordance with manufacturer's specifications and recommendations <u>PAINTWORK, ETC TO NEW SURFACES ON</u> <u>PLASTER BOARD SURFACES WITH</u> <u>One coat alkali resistant plaster primer and two coats superior matt acrylic paint on</u>			
1	Ceilings and cornices	m2	951	
2	Walls	m2	2,291	
	<u>ON WOOD SURFACES</u>			
	Carried Forward		R	
	Bill No. 8 PAINTWORK			

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Item No		Quantity	Rate	Amount
	<u>BILL NO 9</u> <u>PROVISIONAL AMOUNTS, ETC</u> <u>SUPPLEMENTARY PREAMBLES</u> <u>General</u> All prime cost and provisional amounts are net <u>Overheads and profit</u> The contractor may allow for overheads and profit if required in the item "Allow for overheads and profit" wherever indicated <u>Profit and general attendance upon selected subcontractors</u> The item "Allow for profit and general attendance" which follows each selected subcontractor, shall be deemed to allow for the contractor's profit if required and to cover all the contractor's costs incurred in providing free of charge to the selected subcontractors, the following: 1. Access to the site and places where the subcontract work is to be carried out, including the reasonable use of any temporary personnel hoists erected by the contractor 2. Hoisting of the subcontractor's material in batches that can be handled by the contractor's hoist or crane during normal working hours 3. The provision of water and lighting and of single phase electric power to a position within 50m of the place where the subcontractor's work is to be carried out other than water, fuel and power for commissioning of any installation 4. The provision of an area for the subcontractor to establish temporary office accommodation and workshops and for the storage of plant and materials and goods Carried Forward Bill No. 10 PROVISIONAL AMOUNTS, ETC			
			R	

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	Brought Forward		R		
	5. The use of erected scaffolding belonging to the contractor, along with others having the like right. Scaffolding will remain erected on site until all work which requires the use thereof has been completed				
	6. The use of ablution facilities and the like, where provided				
	7. The use of the site telecommunication facilities, where provided, subject to payment by the subcontractor for usage thereof				
	8. Making good in all trades and cleaning down and removal of rubbish on completion				
	<u>Preliminaries</u>				
	The contractor is referred to the Preliminaries for further amplification of "Prime Cost Amounts"				
	<u>BUDGETARY ALLOWANCES</u>				
	<u>Sundry building work</u>				
1	Provide the sum of R100 000-00 for builder's work in connection with services.	Item		100,000.00	
	<u>PROVISIONAL SUMS FOR SELECTED SUBCONTRACT WORKS</u>				
	<u>SIGNAGE</u>				
2	Provide the sum of R250 000-00 (Two hundred and fifty thousand) for signage	Item		250,000.00	
3	Allow for profit and general attendance	Item			
	Carried to Summary				
	Bill No. 10 PROVISIONAL AMOUNTS, ETC		R		

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	CARRIED TO FINAL SUMMARY		R	

BILLS OF QUANTITIES : ELECTRICAL WORKS



ANDERSON
CONSULTING ENGINEERS

Appendix A

GENERAL ELECTRICAL INSTALLATION

Electrical Installation General Specification Document

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A.1) SCOPE

This specification details the requirements for the design, manufacture, installation, testing and commissioning of all electrical installations.

A.2) APPLICABLE DOCUMENTS & STANDARDS

- SANS 10142:** Code of Practice for the Wiring of Premises
- OSHA (Act85):** Occupational Health & Safety Act
- SANS 0114:** Interior Lighting
- SANS 162:** Metal Conduit
- SANS 1507-1:** Electric Cables with Extruded Solid Dielectric Insulation for Fixed Installations (300/500V to 1,900/3,300V) Part 1: General
- SANS 1507-2:** Electric Cables with Extruded Solid Dielectric Insulation for Fixed Installations (300/500V to 1,900/3,300V) Part 2: Wiring Cables
- SANS 1507-3:** Electric Cables with Extruded Solid Dielectric Insulation for Fixed Installations (300/500V to 1,900/3,300V) Part 3: PVC Distribution Cables
- SANS 1507-4:** Electric Cables with Extruded Solid Dielectric Insulation for Fixed Installations (300/500V to 1,900/3,300V) Part 4: XLPE Distribution Cables
- SANS 1507-5:** Electric Cables with Extruded Solid Dielectric Insulation for Fixed Installations (300/500V to 1,900/3,300V) Part 5: Halogen-Free Distribution Cables
- SANS 1507-6:** Electric Cables with Extruded Solid Dielectric Insulation for Fixed Installations (300/500V to 1,900/3,300V) Part 6: Service Cables
- SANS 97:** Electric Cables - Impregnated Paper-Insulated Metal-Sheathed Cables for Rated Voltages 3,3/3,3kV to 19/33kV (Excluding Pressure Assisted Cables)
- SANS 1339:** Electric Cables - Cross-Linked Polyethylene (XLPE) Insulated Cables for Rated Voltages 3,8/6,6kV to 19/33kV
- SABS 1411-1:** Materials of Insulated Electric Cables & Flexible Cords Part 7: Conductors
- SABS 1411-2:** Materials of Insulated Electric Cables & Flexible Cords Part 8: Polyvinyl Chloride (PVC)
- SABS 1411-3:** Materials of Insulated Electric Cables & Flexible Cords Part 9: Elastomers
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- SABS 1411-6:** Materials of Insulated Electric Cables & Flexible Cords Part 12: Armour
- SABS 1411-7:** Materials of Insulated Electric Cables & Flexible Cords Part 13: Polyethylene (PE)

Where any document or standard is referenced, it shall be deemed to be the latest version of that document.

A.3) REQUIREMENTS

A.3.1) GENERAL

The supervision of all electrical work carried out by the Contractor shall be done by qualified licensed and competent personnel.

A list of key personnel and their CV's shall be submitted to the Engineer at the time of tendering, for his approval.

A sufficient complement of such personnel shall be maintained on site. Changes to key personnel shall only be done with the written consent of the Engineer.

The full time presence on site of the above approved supervisory personnel is required.

The Contractor will be responsible for:

- The Supply of Tools, Material & Equipment Required for Construction
- Transporting, Offloading & Storage of All Above to Site
- The supply, delivery, installation, termination and testing of all cabling. This cabling includes all power reticulation cabling, both MV and LV as well as all internal wiring required.
- The design, supply, delivery and installation of all cable trays according to routes indicated.
- The supply, delivery and installation of all conduit and power skirting according to routes indicated.
- The supply, delivery and installation of all small power distribution boards, conduit and conduit fittings, luminaries, switches, switched socket outlets, trunking, cable and wire, termination kits and all other paraphernalia required to effect a fully operational small power installation.
- QA & Test Certification as Required & Detailed Elsewhere
- Final Documentation as Detailed Elsewhere in this Document

In the absence of a compulsory site visit, the tenderer shall ensure that he has satisfied himself of the prevailing site conditions. No claims in this regard will be entertained.

The tenderer will allow for any items not specifically mentioned in the BOQ, but which are obviously required for the successful completion of the job.

Where a serious omission is noted by the Contractor, he will communicate his concerns to the Engineer as soon as he becomes aware of such an omission.

Where a Contractor intends to deviate from this specification, he will communicate his intention to the Engineer. Such deviation will only be allowed at the discretion of the Engineer. Where no such notice of deviation is received from the tenderer, it will be assumed that his offer meets all requirements of this specification.

A.3.2) COMPLIANCE WITH REGULATIONS, STANDARDS & SPECIFICATIONS

The complete Electrical Installation shall satisfy all National and Local Laws, Standards and By-Laws as applicable to the area where the installation is to take place.

The installation shall be carried out in strict accordance with the current Rules and Regulations of OHSA Act 85 and the local Fire Regulations.

An Electrical Certificate of Compliance (COC) shall be issued by the Contractor upon completion of his work.

Where the installation is in a hazardous environment, all relevant SANS codes shall apply. The Contractor will be provided with the relevant Hazardous Area Classification by the Engineer. He will ensure that he installs equipment which is correctly rated for the area.

Equipment shall be installed so as to ensure that:

- Inspection, Maintenance, Cleaning & Replacement is Easy to Perform & at Minimum Cost
- Safe Operation Under Site Conditions is Ensured

All Client enforced safety standards shall at all times be observed and adhered to by the Contractor. All site personnel will be required to attend the Client's safety induction training. The Contractor will accordingly provide for this in his submission.

Where a Contractor is barred from site by the Client appointed safety personnel, no claim for standing time will be entertained.

The Contractor will at all times maintain and keep up to date a safety file and present it on demand, for inspection, to the Engineer or the Client's Safety Officer.

A.3.3) SAFETY & SWITCHING

At no time will any circuit be powered up without the prior written approval of the Client's Electrical Engineer. The Contractor will inform the Engineer of his program in good time so that the necessary permission can be issued and the appropriate safety steps taken.

A.3.4) COMMUNICATION WITH THE RELEVANT SUPPLY AUTHORITY

The Contractor will be responsible for communicating to the Relevant Supply Authority, be it a Local Authority or the Client himself, all requests for switching.

The Contractor will be responsible for ensuring that a circuit is safe to work on when it is switched off.

A.3.5) QUALITY OF MATERIALS & WORKMANSHIP

Only new and unused materials of best quality shall be used. Materials shall, where applicable, comply with SANS specifications and where possible be of South African manufacture. This applied in particular to electrical cable.

Jointing of cores is not permitted. Joints in cable are only allowed when the length of cable exceeds the standard manufactured length of cable on a drum. Joints will only be made using an approved jointing kit and by qualified personnel. Buried joints will be clearly marked and noted on "as built" drawings.

The trimming of strands in order to fit a cable core into a lug is not permitted. Where a connection is required to be made using a nut and bolt, the nut and bolt shall be high tensile steel and appropriately treated against corrosion. Spring washers are not permitted. Cup washers will be used. The bolt and nut shall be torqued to manufacturer's specifications.

The storing, transporting, handling and laying of cables shall be carried out in accordance with approved and accepted practice. When cable is rolled off a drum, it shall be adequately supported to prevent twisting, undue tension and subsequent damage. The Contractor will have at his disposal all tools and equipment required to lay and install cable correctly.

Before any cables are laid, the Engineer or his representative will inspect all cable trays, supports, trenching and routing in general.

Installation of instruments and other equipment shall be installed in accordance with the manufacturer's specifications and project requirements.

Shoddy workmanship will not be permitted.

All cabling points of entrance or egress from buildings will be adequately sealed against the adverse effects of weather and vermin. ROXTEC or expanding foam will be acceptable.

All cables, including spares should be terminated and marked in accordance with Client requirements.

Any work not conforming to the specification, or general requirements of good workmanship shall be made good or replaced at the discretion of the Engineer.

A.3.6) CABLE TRAYS/RACKING/TRUNKING/POWER SKIRTING

The Contractor shall supply and install the appropriate cable trays as required by the cable routes. Provision should be made for 30% extra space in the width of the cable trays for future expansions.

Cable racks will in general be medium to heavy duty perforated, galvanized and of local manufacture. Mesh type racking may be acceptable in light application and above false ceilings.

Racking shall be supported at maximum centers of 1,5m, depending on the load and span. Racks shall also be supported at each change of direction. Supports may be fixed either from a wall and/or ceiling; rawl bolted or clamped whichever is applicable. Minimum distances between walls/ceilings and cable racks will be 150mm.

Trunking/sleeving should have the capacity to cater for at least the same amount of cable already installed, or as otherwise specified.

Where the Contractor is required to weld or drill any existing structure in order to affix cable supports, this will only be carried out with the approval of the Client.

Power skirting will in general have at least two compartments or as otherwise specified. Power circuits will be tapped every 500mm and the looped wire left inside the trunking, if not immediately connected to a socket outlet.

A.3.7) CONDUIT

Conduit installed in areas designated as office space will be flush mounted. PVC conduit is acceptable.

Conduit installed in workshop or other industrial areas will be steel. All metal conduit will conform to SANS 162-2011.

A3.7.1) METAL CONDUIT

Metal conduit shall be of heavy gauge solid drawing or welded steel, bearing the SABS mark. Except where otherwise stated, all conduits shall be galvanized.

All cast metal conduit accessories shall be of the malleable iron inspection type.

Metal conduit shall be assembled by means of the "BOSAL" system of threadless conduit fittings. All accessories used on the "BOSAL" system shall be cadmium plated.

Mechanical earth continuity must be ensured at all points.

A3.7.2) PVC CONDUIT

PVC conduit is permitted in offices and other non-industrial areas.

A3.7.3) SURFIX CABLE

Surfix cabling will be allowed where specified on the electrical drawings and single line diagrams.

A3.7.4) FLEXIBLE CONDUIT

All flexible conduit shall be of the type with a flexible galvanized shell core, with a black watertight oil-resisting PVC sheath.

Termination fittings for the conduit shall be of the watertight screwed type, fitted with nylon sealing rings and screw-in earth continuity cones. Flexible conduit shall be equal and similar to "Sealtite" or "Hydratite" manufacture.

A.3.8) CONDUIT INSTALLATION PRACTICE

A3.8.1) GENERAL REQUIREMENTS

Lighting and plug circuits are to be run in separate conduits and not more than one circuit will be allowed in a conduit, except where otherwise specified.

Likewise, each point shall be wired through a conduit dedicated to that power point only, except where otherwise specified.

Conduit installed in ceiling in roof spaces shall be run parallel and at right angles to roof members and not at random and is to be securely saddled at intervals not exceeding 1,5m for metal and 1.0m for PVC. Conduit installations for confined spaces of less than 1,0m clearance or where the space will after completion of the work be inaccessible, shall be carried out from outside such space.

Metal conduit terminating in boxes, trays, etc., shall be finished off with lock nuts and brass bushes.

Except in the case of concrete slabs, conduit terminating in ceiling points is to be taken to the face of the ceiling and finished off under the fittings with a brass or plastic bush depending on the type of conduit used. Conduit shall be firmly supported at these points.

All conduit joints are to be tightly assembled. Screwed running joints with long threads are to be provided with a lock nut to ensure a mechanically strong and electrically continuous joint.

The entire conduit system is to be electrically and mechanically continuous throughout.

A3.8.2) CHASING & BUILDING IN

The Civil Contractor will be responsible for the building in of all conduit, switch boxes, distribution boards etc., which are to be built in as work progresses. It is however the responsibility of the Electrical Contractor to ensure that conduits are correctly positioned and he must ensure at all times that the conduit is placed in position in good time. The Electrical Contractor will be held responsible for any delays or damage caused by failure to observe this clause. Where by arrangement with the Civil Contractor, the Electrical Contractor is required to chase conduit, all such work and consequent damage as well as the making good thereof, shall be for the Electrical Contractor's account.

A3.8.3) CONDUIT IN CONCRETE

Conduit shall be installed as close as possible to the neutral axes of concrete beams or slabs. Conduit and outlet boxes shall be securely fixed to shuttering to obviate displacement during the pouring of concrete.

Conduit shall drop to the lower face of concrete and terminate at outlet boxes only at points where such boxes are to be installed. On existing concrete structures, conduit shall be run only in approved positions and where required, the depth of chasing of such structures shall be approved.

The Contractor will liaise closely with other Contractors and providers of other services in order to ensure that clashes with other equipment are kept to the bare minimum.

The Electrical Contractor is to be present during the casting processes so as to ensure that no damage or displacement occurs to conduit.

Immediately after each section of shuttering has been stripped, the Electrical Contractor shall by means of steel tape establish whether all conduit boxes are accessible and all conduit runs intact and clear. Any shortcoming detected at this juncture must be immediately rectified in an approved manner.

A3.8.4) CONDUIT ON SURFACE

Where surface work is permitted, conduit runs shall be perfectly straight and level.

After completion of surface work, no exposed thread shall show, except where running joints occur. The latter shall only be resorted to where absolutely unavoidable and must be fitted with a sliced coupling as a lock nut.

Saddles shall be fixed by means of approved patented wall plugs. Screws used will be plated or passivated.

All saddles shall be galvanized hospital type spacer saddles.

A3.8.5) BENDS & DRAW BOXES

Normal bends or elbows will not be allowed except where specifically approved. All sets shall have a radius of at least five times the outside diameter of the conduit and conduit showing signs of flatter or cracking shall be rejected.

Draw boxes shall be installed in approved positions so that not more than two bends occur between one end of a run and draw box or between boxes. Draw boxes shall be arranged so as to be accessible after the completion of the building and must be provided with cover plates, which shall finish neatly and flush in the final surface, except where the surface is finished in paneling, in which case a door to match the paneling shall be provided at the expense of the Electrical Contractor.

Draw boxes shall, where possible, be located in inconspicuous places allowing for a common cover and rectangular shall be square with respect to walls.

A3.8.6) REAMING

The ends of all conduits shall be cleaned internally by means of a reamer of all burrs and rough edges in compliance with the Wiring Code.

A3.8.7) WALL BOXES

Wall boxes for socket outlets, switches, micro-gap isolators, etc., shall be of the heavy gauge pressed steel galvanized type, provided with lugs and shall be drilled and tapped for fixing screws. Where appropriate and permitted, boxes of rigid plastic, bearing the SABS mark, may be employed.

Knock-out conduit entry holes shall be provided on all sides, including the back.

All steel wall boxes shall be treated with "Anodite" red oxide primer before installation, applied by brush or by dipping, as an added rust proofing agent. Before applying the primer, all surfaces shall be cleaned with a suitable emulsion type galvanized iron cleaner.

The normal dimensions of wall boxes shall be as follows:

- Singe Switch Units: 50x100x50
- Two Switch Units on Common Cradle: 50x100x50
- Switched Socket Outlets (Single or Double): 100x100x50
- Plug & Special Miniature Single Pole MCCB: 100x100x50

Not more than one circuit shall appear in any one wall box except where otherwise specified. The Electrical Contractor shall supervise the building-in of wall boxes to ensure correct positioning.

A3.8.8) EXPANSION JOINTS

Where conduit installed in concrete crosses a building expansion joint shall be provided with a conduit expansion joint in the conduit run, without loss of earth continuity.

A.3.9) FLUSH-MOUNTED DISTRIBUTION BOARDS

Care must be taken to make sure that expanded metal to the rear of bonding trays are spot-welded properly where installed in 115mm walls.

Panels must be fixed to the architrave frame by means of two fixed locating pins and two chromium-plated screwdriver or square key quick-release and quick-loss catches. Self-tapping screws are not acceptable.

A.3.10) WIRING OF CONDUIT

A suitable rated 3 phase 4 wire 50Hz supply will be available from the local LT supply main DB to the subsequent DB's. Available voltages may vary from site to site. The Contractor will be informed of the voltages in the RFQ document.

Circuits shall consist of the following wire types:

Phase	Neutral	Earth
• Lighting (General)	2.5mm	2.5mm
• Lighting (High Bay)	4mm	4mm
• 16A Socket Outlets	2.5/4mm	2.5/4mm
• Console AC Units	4mm	4mm
• UPS 16A Socket Outlets	4mm	4mm
• Welding Plugs	6mm	6mm

All wiring shall be carried out in a 600V Grade PVC insulated wire. Wiring of any circuit shall only be carried out after the whole of that particular circuit conduit installation has been installed and fixed into positions.

It should be possible for wires to be drawn through the complete conduit installation without any undue strain.

Not more than five 2.5mm² or four 4.0mm² together with earth wires where applicable will be allowed in 20mm tubes, or in accordance with SANS 10142.

All conductors shall be in colours selected to facilitate identification of circuits, black being reserved for neutral conductors, and green/yellow for insulated earth conductors. Three phase circuits shall be colour coded to identify phases.

All metal conduits must be earthed and bonded to form effective earth continuity conductors. In addition a bare copper earth continuity conductor shall be drawn into each conduit serving apparatus which is required to be earthed in terms of the Standard Regulations for the Wiring of Premises.

Earthing clips or straps are to be made of copper.

A.3.11) CABLE ROUTES

Supply and install cables on underground or surface routes as indicated on the drawings. The cable schedules, if provided, indicate provisional route lengths which are to be used for tendering purposes but the actual lengths required are to be measured on site and these lengths submitted to the Engineer for approval before ordering. Any variation between tendered and measured lengths will be covered by price adjustments in accordance with the Contract variation rates.

NOTE:

Where parallel cables are specified the cable lengths are to be calculated by multiplying the route length by the number of parallel cables.

A.3.12) CABLE SPECIFICATION

No damaged or previously used cable will be accepted.

Cable shall be manufactured and supplied on one length to the lengths specified unless these lengths exceed a standard drum length, in which case a ruling shall be obtained from the Engineer. Under no circumstances will joints be allowed unless specifically directed in writing by the Engineer.

A3.12.1) LOW VOLTAGE PVC CABLES

All electrical cables must be sized according to load current and voltage drop as required by SANS 10142.

If not elsewhere specified all power cable supplying three phase units shall be either three or four core, with the black conductor serving as neutral, PVC PVC SWA PVC to SANS 1507.

The minimum cable size shall be 2.5mm².

A3.12.2) MEDIUM VOLTAGE PAPER-INSULATED LEAD-COVERED CABLES

Cables shall be manufactured in accordance with SANS 97 and shall come only from fresh stocks.

The cable construction shall be impregnated paper-insulated/lead alloy E sheathed type with an extruded PVC impermeable bedding for protection against electrolysis/double steel tape or galvanized steel wire armoured/outer PVC sheath.

The conductors shall be of high conductivity, annealed, stranded copper that may be shaped or circular.

The conductor insulation shall consist of impregnated paper tapes, either pre-impregnated or mass-impregnated with a non-draining compound.

The bedding shall consist of an extruded layer of PVC and the sheath shall be lead alloy E. The serving shall consist of watertight extruded black PVC to eliminate electrolytic corrosion of the cable.

Where the cables may be subject to severe vibration, the lead sheath shall be alloy B instead of alloy E. (Roadway crossings, bridges or near railway tracks).

Armouring shall consist of double steel tape of galvanized steel wire. It should be noted that a cable with wire armour has a much higher earth fault rating than a cable with tape armour and that in vertical installations only wire armoured cable shall be used.

The cable insulation shall be suitable for the supply voltage specified and the cable must be suitable for a system with an unearthed neutral.

At the request of the Engineer, tests shall be carried out on production runs of the cable in accordance with SABS 97.

A3.12.3) MEDIUM VOLTAGE CROSS LINKED POLYETHYLENE CABLES

Cables shall be manufactured in accordance with SANS 1339 and shall come only from fresh stocks.

The cable construction shall be of cross linked polyethylene dielectric (XLPE) type with conductors and core screens, bedding tape, copper tape screens, binder in the case of multi core cables, extruded bedding, armouring (steel wire or aluminium as specified) and an outer PVC sheath.

The conductors shall be of high conductivity, annealed, stranded copper or aluminium in accordance with SABS 1411: Part 1.

A semi conducting screen shall be provided on each conductor, either extruded or taped. The dielectric shall be in continuous adherent contact with the conductor screen and be itself covered with a semi-conducting core screen and a metallic screen. Semi-conducting bedding tape is required.

The core screen may be semi-conducting tape, overlapping, or extruded, as allowed in SABS 1339-2010. The metallic screen shall be annealed copper tape as allowed in SABS 1339-2010.

Cables shall be either single core type A1 or A2, three core type A, type B or type C as specified.

Where subject to environmental conditions deleterious to the dielectric, a lead alloy sheath (alloy B or E as specified) and heat barrier in accordance with SABS 1339-2010 may be specified.

PVC bedding for armoured cables is required. Armouring shall be steel wire armour (SWA) in the case of 3 core cables and where required and shall be hard drawn aluminium (AWA) in the case of single core cables and where required.

The outer sheath shall be PVC, colour as specified and U/V stabilised where specified.

At the request of the Engineer (and if specified), tests shall be carried out on production runs of the cable in accordance with SABS 1339-2010.

A3.12.4) INSTALLATION OF CABLES IN TRENCHES, SLEEVES & DUCTS

The storing, transporting, handling and laying of cables shall be carried out in accordance with approved and accepted practice. When cables are rolled off the drums, it shall be adequately supported to prevent twisting, undue tension and subsequent damage. The Contractor must have at his disposal enough and adequate equipment and labour to prevent damage to the cables during these operations.

Before any cables are laid, all trays shall be inspected by the Engineer or his representative.

Except where otherwise specified, trenches for cables up to 1,000V shall be 600mm deep, whilst trenches for cables in excess of 1,000V shall be 900mm deep.

Trenches shall be wide enough to accommodate all cables of like voltage in one horizontal plane, separated by at least twice the diameter of the largest cable.

Danger tape shall be provided and laid by the Contractor, 200mm above cables.

Properly sifted bedding soil shall be placed in the bottom of the trench to a depth of 50mm. The cables shall be covered with a further layer of sifted soil to a depth of 100mm. The soil used will not be river sand but will match the soil removed during excavation of the trench.

Prior to any trench being closed, the Contractor will call the Engineer to inspect. In laying and covering underground cable, due cognisance should be taken of the theft risk associated with cables lying exposed and uncovered.

Cable markers shall be provided and installed by the Contractor at the beginning and end of a cable trench as well as any direction change.

A3.12.5) EXCAVATIONS & TRENCHING

- a) Hard Rock shall mean granite, quartzitic sandstone, slate and rock of similar or greater hardness, solid shale and boulders over 300mm in diameter. For the purpose of applying representative rates for trench excavations this definition may be further subdivided into rock that may be dislodged and loosened by machine, e.g. jackhammer, ripper, etc. and all rock so firmly cemented as to present all characteristics of solid rock which can only be removed by drilling and blasting.
- b) Soft Rock shall mean rock that can be loosened by hand-pick and includes hard shale, compact ou-klip and boulders from 75mm up to 300mm in diameter.
- c) Earth shall mean ground that can be removed by hand-shovel and includes loose gravel, clay, make-up ground, loose or soft shale, loose ou-klip and boulders less than 75mm in diameter.

NOTE:

Notwithstanding that a formal site inspection may or may not have been held, all excavations and trenches shall be priced in accordance with the rate applicable to Soft Rock. It shall be determined at the time of executing the work which category actually applies, or if differing conditions are encountered, what quantities of each category apply and the Contract shall be adjusted accordingly.

In trenches made in soft and hard rock, the cables shall be laid on a 75mm thick bed of sieved sand and be covered with a 150mm layer of sieved sand before the trench is filled. The first 300mm of backfilling above all cables shall be completely free of stones.

NOTE:

For the purposes of the Tender it shall be assumed that neither sieving of sand nor importing of sieved sand shall be required. A rate shall, however, be provided for sieving excavated material and for importing sieved sand so that the Contract may be adjusted according to the actual requirements.

The Contractor shall, before excavations commence, familiarize himself with the route and conditions on site and it shall be his responsibility to obtain the necessary information with regard to other plant along the route and every effort shall be made to avoid damage to this plant.

The exact positioning of trenches shall be approved on site by the Employer and/or Engineer and excavations shall not commence until approval has been received.

The cable trenches shall be excavated to a depth of 1 000mm and 6-00mm below ground level for MV and LV cables respectively and shall not be less than 300mm wide for one or two cables, and the width shall be increased where more than two cables are laid together, so that the cables may be placed at least 150mm apart throughout the run. The bottom of the trench shall be level and clear, and the bottom and sides free from rock or stones liable to cause damage to the cables.

Tenderers may, with the permission of the Principal Contractor and with the approval of the Engineer obtain information regarding the water table on the Site. The cost of excavation shall include for removing water from the trenches. The Tenderer should satisfy himself on this matter and may carry out tests on Site.

The Contractor shall take care to avoid damage to buried pipes such as earthenware drain and effluent pipes, etc.

A3.12.6) CABLE INSTALLATION

All cables to be installed by qualified personnel having the necessary skill, training and experience.

Cable bend radius to be at least twelve times the diameter of the cable over armouring. Sufficient slack to be left to relieve stresses.

All ends shall be sealed off immediately after cutting to prevent moisture absorption.

The Contract Price shall not include making good concrete or macadamized surfaces.

Should any cable routes cross any roads or railways, these crossings must be sleeved by 150mm diameter reinforced concrete pipes which are to be supplied and installed by the Principal Contractor. In each case a spare sleeve is to be provided for possible further additions. Only one cable is to be installed in a cable pipe duct or sleeve except in the case of very small cables if there are insufficient ducts for all cables.

Cables in trenches shall be laid with sufficient slack to relieve stresses. The cables shall be clamped where necessary to relieve the stress on joints of the lead sheath.

The Contractor shall provide all necessary equipment and labour for handling cables and for drawing into ducts, etc. All bends shall be in easy sweeps and no twisting of cables shall take place. All ends for drawing into sub-stations, building, etc., and overlaps for jointing shall be allowed. All cutting, capping and depressing of cable ends must be carried out by the Contractor. Cables must be handled with care to ensure that the insulation will not be damaged. In all cases where long lengths are pulled a purpose-made cable sock and cable rollers shall be used.

The Contractor shall take the necessary precautions to avoid injury or damage as a result of the excavations and the Contractor will be held liable in the event of claims arising from such injury or damage. Tenderers are advised to include for taking out a suitable insurance policy.

Prior to laying the cables in the ground the trench shall be inspected thoroughly to ensure that it is free from all objects likely to damage the cable either during or after cable laying operations.

Except where ducts, tunnels or pipes are provided and unless instructed to the contrary, the Contractor shall lay the cables direct in the ground.

Cable rollers shall be used at all times whilst laying cables, but they shall have no sharp projecting parts liable to damage the serving on the cables. They shall be placed in the trench in such a manner as to prevent the cable being dragged along the bottom of the trench or ground.

Where cables have to be drawn around corners, skid plates or cable rollers turned on edge shall be used for this purpose. The skid plates shall be well lubricated and must be securely fixed between rollers and must be constantly examined during cable laying operations.

The Contractor shall ensure that during laying operations the minimum bending radius is not exceeded. Particular care should be taken where the cables are "flaked" for ease of laying.

When more than one length of cable is laid between two points, the cable shall be laid in one direction only to avoid cross-over of phase cores in joints.

In the event of the Contractor having to extend an existing cable, it shall be his responsibility to obtain the existing cable phase rotation to ascertain in what direction he has to lay the new cable.

Where the Contractor has to lay two cables for a future "cut-in" to an existing cable, he shall at all times lay the first cable in the one direction and the second cable in the opposite direction.

Every precaution shall be taken to maintain paper-insulated cable moisture-free during any jointing or terminating operation, and when cables are cut the ends shall be immediately lead capped to exclude moisture and are to remain sealed until they are to be made off. No temporary sealing will be permitted.

A3.12.7) BACKFILLING & REINSTATEMENT

All excavations made shall be backfilled in 300mm layers, the earth in each layer being well tamped and consolidated and sufficient allowance made for settlement.

The refilled trench shall be maintained by the Contractor at his expense, in a thoroughly safe condition for the duration of the Contract.

All backfilling of road crossings shall be preferably consolidated with a mechanical power-driven compactor.

Surplus excavated material shall be disposed of by and at the cost of the Contractor who shall leave the trench and adjacent area in a clean and safe manner.

A3.12.8) CABLES LAID IN PIPES, DUCTS & CABLEWAYS

Where specified, cables to be laid under railways or roads shall be laid in Pitch Fibre or Fibre Cement Pipes. (Pipe sleeves by others).

The Contractor shall ensure that all cable pipes are sound, clean and free from "rag" before drawing cables therein. Where numerous pipes are to be installed, they shall be installed in banks with a maximum of three banks. The minimum clearance between the uppermost pipe and the finished road level shall be 750mm. Where spare pipes are installed, their ends shall be blanked off with suitable "End Caps" after they have been cleared of any soil, etc., that might have entered at the time of installation. After the cables have been laid the ends of the pipes shall be sealed with a weak mix of coarse builder's sand and cement, the price of which shall be included for in the unit price for laying the cable pipes.

A3.12.9) BURIED CABLE MARKERS

All buried cable routes shall be marked with approved concrete slab type cable markers at intervals of not more than 20m and at every change of direction. The positions of all cable markers are to be approved by the Engineer and the actual location of the cable markers is to be recorded accurately by the Contractor on drawings. The exact information recorded on the cable marker is to be decided in conjunction with the Engineer.

A.3.13) JOINTING & TERMINATING OF CABLES

Connection of cables to switchgear shall always be effected in such a way that the various phases, seen from the front of the switchgear shall be in the following positions:

- No. 1 Conductor:** Left (red) (A)
- No. 2 Conductor:** Centre (white) (B)
- No. 3 Conductor:** Right (blue) (C)

Exposed armouring shall be covered with bitumen-base paint.

All cable ends shall be supplied with the necessary earth connection.

A channel or other approved means of support shall be provided to remove mechanical stress from the glands.

Cable cores shall be marked with heat-shrunk sleeves where necessary to identify the phases.

The current-carrying capacity and breakdown voltage of the cable end shall be the same as for the complete cable.

Cables shall be terminated in accordance with the recommendations laid down by the manufacturers of the cables and glands employed.

It is a definite requirement that the Contractor shall only employ personnel fully conversant with cable manufacturer's recommendations for joining and terminating cables.

A3.13.1) HEAT SHRINKABLE MATERIALS

Heat shrinkable materials may only be used in exceptional circumstances with the written permission of the Engineer.

The complete kit shall be packed in a container that is marked for the type of cable insulation and construction as well as the voltage range for which the materials are suitable.

An illustrated set of instructions for the installation of the materials shall accompany every kit.

The joints and terminations shall make minimal, if any, use of insulating or stress relieving tapes. The use of electrical stress control and insulating tubing that is heat-shrunk onto the termination or joint is preferred above other methods.

The materials shall comply with VDE 0278 and the supplier shall be called upon to confirm this aspect before acceptance of the materials or installation.

The heat-shrinkable and other materials used for the terminations and joints shall be of a high quality and shall retain their electrical and mechanical properties without deterioration.

a) Terminations with Heat-Shrinkable Materials

- i. Terminations shall be made of a material that gives lasting protection against ultraviolet radiation.
- ii. The cores of all cables terminated outdoors and the cores of 3,3kV and higher voltage cables terminated indoors, shall be completely covered with a shrunk-on protective layer against surface tracking, ultraviolet radiation and weathering.
- iii. Outdoor terminations shall be designed to prevent flashover under wet or contaminated conditions and to ensure additional mechanical strength. This shall be achieved with shrunk-on insulating spacers and rain shields.

b) Joints with Heat-Shrinkable Materials

- i. The electrical continuity of all the conductors, screens and armouring shall not be impaired by the joints and the earth continuity shall be accomplished within the joints, i.e. no external earth continuity conductor that will be subject to corrosion, is acceptable. The joints shall be completely covered by a watertight sheath to prevent corrosion.
- ii. In the case of joints in cables with an outer PVC anti-electrolysis sheath, the joints shall be subject to the same electrical insulation test as the outer sheath of the cable.

c) Resin Filled Joints

- i. The resin filled joint kit shall comprise a self-sealing plastic mould of high mechanical strength having sufficient connector space.
- ii. The exact amount of cold hardening resin shall be provided in a two-compartment plastic bag.
- iii. The resin shall have absolute minimum shrinkage.
- iv. The mould and resin shall be completely waterproof and non-hygroscopic and shall be resistant to ultraviolet radiation.
- v. Joint kits shall be of "SCOTCHCAST", "CELLPACK" or similar.

d) Cable Box Joints

- i. Cable box shall be manufactured of die cast aluminium material for normal conditions or glass fibre reinforced thermosetting compound where exposed to corrosive conditions.
- ii. The lid shall provide an absolute moisture barrier.
- iii. Boxes shall contain 2, 3 or 4 entries as required.
- iv. Unused entries shall be sealed with watertight blanking plugs.
- v. Earth continuity shall be maintained through the box by means of the material of the box in the case of aluminium boxes or by means of earth straps and studs in the case of glass fibre reinforced boxes.
- vi. Cable boxes shall be of "PRATLEY", "CCG HANDIFIT" or similar manufacture.

A3.13.2) TERMINATIONS OF PAPER-INSULATED CABLES

The ends shall be terminated in cable end boxes field with bituminous, cold filling or resin oil semi-fluid compound or heat shrinkable terminations in accordance with clauses 3.14.1 above.

a) Testing For Presence of Moisture

Before terminating or joining paper-insulated cables, a test to establish the presence of moisture must be carried out.

The following procedure should be followed:

- Place an adequate quantity of cable impregnating oil in a suitable container and heat up to 130°C +/- 5°C
- Cut a small length (± 300 mm) of the cable concerned and remove the armouring and sheath, taking care not to handle the dielectric in any way.
- Dip a section of the outer insulating impregnated paper (belt paper) in the heated oil, taking care not to contaminate the tapes with moisture from the hands. If frothing appears on the surface of the oil, this is a clear indication of the presence of moisture in the paper.
- The same procedure should then be repeated on the insulating impregnated paper around the cores (especially those layers closest to the cores). Frothing will also indicate the presence of moisture.
- Should only a small number of bubbles appear on the surface of the oil, this is an indication of air bubbles on the paper and not moisture since the presence of moisture will result in a series of bubbles rising to the surface of the oil for a number of seconds, until all moisture has been removed.

The armouring shall be bonded to the main earth bar of the switchgear or transformer.

The lead sheath shall be wiped against the conical wiping gland.

All cut cables ends which will be exposed to the atmosphere for more than two hours shall be sealed and wired to prevent penetration of moisture.

b) Cable End Boxes

Cable end boxes shall be suitable to accept paper-insulated lead covered cables.

The cable end boxes shall be of the metal clad type suitable for indoor or outdoor use as required for the specific application. Only inverted type boxes shall be supplied for outdoor use. The insulators of the inverted type boxes are angled downwards.

The boxes shall be equipped with armour clamps and brass or gunmetal conical wiping glands.

The cable boxes shall be suitable for filling with bituminous, cold filling compound or resin oil semi-fluid compound.

The cable boxes for resin oil semi-fluid compound shall be equipped with a sight glass for compound level indication.

c) Cable End Box Filling Compound**d) Bituminous Compound**

The compound boxes shall be suitable for filling metal clad cable end boxes.

The compound shall comply with BS 1858, shall be non-hygroscopic and shall have a high dielectric strength and insulation resistance.

The compound shall have good adhesive properties and shall not be susceptible to cracking.

The compound shall be suitable for use in high ambient temperatures and system voltages of up to 22kV nominal.

e) Resin Oil Semi-Fluid Compound

The compound shall be suitable for filling metal clad cable end boxes with level indicators.

The compound shall have a pouring temperature above 100°C.

The compound shall be non-hygroscopic and shall have a high dielectric strength and insulation resistance.

The compound shall have minimal contraction when cooling.

The compound shall be "HENLEY COMPOUND NO. 57018, INSULOL DG" or equivalent.

f) Quantity

An adequate quantity of compound shall be supplied to fill each cable end box. The supply of the compound is included in the contract. The compound level shall be checked after approximately six months and topped up.

A3.13.3) TERMINATIONS OF XLPE CABLES

Cross-linked polyethylene cables (XLPE) shall be terminated in accordance with the requirements for terminations and joints specified above unless a pre-fabricated system based on pre-moulded slip-on EPR stress cones is used.

The copper tapes of the earth screen on the cable shall be bonded to the main earth bar of the switchgear or transformer, but the bond shall be easily removable for testing purposes.

The cable shall be firmly secured on the switchgear by means of a clamp to prevent mechanical stress on the cable and terminations.

A3.13.4) TERMINATIONS OF PVC CABLES

Cable ends shall be terminated by means of adjustable glands in accordance with the standard specification for glands, clause 3.4.1 above.

The glands shall be fitted in accordance with the cable and gland manufacturer's instructions.

The correct size and type of gland shall be used for the particular cable and application.

A3.13.5) CONNECTION OF CABLE CONDUCTOR

Suitable lugs shall be used, preferably solidly sweated to the cable conductor ends. Lugs may be crimped, using mechanical or pneumatic tools designed for this purpose, on condition that evidence is submitted that the method used complies with the performance requirements of BS 4579, Part 1: "COMPRESSION JOINTS IN COPPER".

Contact surfaces shall be thoroughly cleaned and smoothed and fixing bolts shall match the hole size of the lug.

Cables that are connected to clamp type terminals where the clamping screws are not in direct contact with the conductor need not be lugged, but the correct terminal size shall be used.

Ferrules shall be used on cable conductor ends where the cable conductors are connected directly to equipment with screws against the conductor strands.

When cutting away insulation from cable conductors to fit into lugs, care shall be taken that no strands are left exposed. Under no circumstances may any of the conductor strands be cut away to fit into lugs.

A3.13.6) JOINTS

Verification or authorized in writing by the Engineer.

Jointing shall be carried out strictly in accordance with the manufacturer's instructions and by personnel competent in jointing the types of cables used.

During outdoor jointing operations, the joint bays shall be adequately covered by tents of waterproof material suitably supported. Where necessary a trench shall be excavated around the bay to prevent the ingress of moisture. The sides of the hole shall be draped with small tarpaulin or plastic sheeting to prevent loose earth from falling in during jointing operations.

The joint shall not impair the anti-electrolysis characteristics of the cable.

The Contractor shall notify the Engineer timeously of the day on which jointing is to be carried out in order that an inspection may be arranged if so required. Any cable joint not inspected by the Engineer because of

insufficient notice being given, shall be opened for inspection and redone at the discretion of the Engineer and at the cost of the Contractor.

MV cable joints on paper insulated cables shall be of the compound cast type and the compound used shall comply with the specification provided above.

MV cable joint on XLPE-insulated cables shall be of the heat-shrinkable type and shall comply with the specification above or shall be based on a prefabricated system utilising pre-moulded slip-on EPK stress cones.

LV cable joints shall be of the epoxy-resin type.

Joints shall be fully water and air tight and shall be free of voids and air-pockets.

The crossing of cores in joints will not be permitted under any circumstances.

A3.13.7) CABLE GLANDS

Mechanical cable glands required for the attachment of cables complying with the requirements of SABS 150 to enclosures for electrical apparatus, including enclosures for type "e" apparatus and enclosures that are dust-ignition-proof or hose-proof or both, shall comply with the requirements of SABS 1213 and shall bear the mark.

Each gland shall bear the following information in legible and permanent marking:

- The Manufacturer's Name, Trade Name or Trademark
- The Size Designation of the Gland
- In the case of glands for use on enclosures for type "e" apparatus, or on enclosures that are dust-ignition-proof or hose-proof or both, an indication to that effect shall be provided.

For outdoor applications and for environments where the cable gland will be exposed to water, suds or oils, gases and dust, the cable gland shall be fitted with a seal and a shroud in accordance with the requirements of Clauses 4.5 and 4.6 respectively of SABS 1213.

Glands required for use on enclosures for type "e" apparatus or enclosures that are dust-ignition-proof or hose-proof or both, shall comply with the requirements of Clause 4.7 of SABS 1213.

Glands for armoured cables required for use on non-metallic enclosures shall be provided with an attachment for the purpose of applying an earthing bond to the gland and shall comply with the requirements of Clause 3.4 of SABS 1213.

Glands for armoured cables required for use in highly corrosive atmospheres and/or for use on enclosures or motor specified for a degree of protection of IP65 or better, shall be tested in accordance with the requirements of IP65/IEE144, shall carry the SABS mark and shall be type CCG EIW by CCG Systems or equal and approved.

A3.13.8) CABLE JOINTING FERRULES & CABLE TERMINATING LUGS

Only ferrules and lugs which meet the requirements of the performance specification BS 4579 – Part 1 may be used, alternatively ferrules and lugs which meet the dimensional requirements of DIN 46235 may be used.

The cross-sectional area of the material of the ferrule or lug shall not, under any circumstances, be less than the cross-sectional area of the conductor to be jointed or terminated.

The size of ferrules and lugs must match exactly the size of the conductor to be jointed or terminated. The use of oversized lugs or the removal of strands of the conductor is not acceptable.

The use of cable lugs with oversized bolt holes or the connection to busbars with undersized bolts is not acceptable.

The crimping of ferrules and lugs shall be carried out by means of the circumferential single hexagonal or, preferably, double hexagonal crimp. Indentation crimping is not acceptable.

Copper cable ferrules and lugs shall be manufactured by a cold forming process, shall be completely free of seams or joints and shall be manufactured by Metmak, BICC-Burndy or equal and approved.

A3.13.9) IDENTIFICATION OF CABLES

Cables shall be identified at all terminations by means of punched metallic bands or marked with labels or tags.

The use of PVC tape with punched characters is not acceptable.

The identification numbers of cables shall be shown on "as built" drawings of the installation and shall correspond with the Cable Schedule.

A.3.14) EARTHING

Provide all required labour, materials and specialized Contractor services necessary for a completely safe installation of an Earthing System in full conformity with requirements of the Wiring Code and authorities having jurisdiction. Include in general the following:

- Main Earth Electrode System
- 230/400 Volt Service & Equipment Earthing
- Miscellaneous Earthing

All earthing shall also be carried out in accordance with BS CP 1013/1965, except where this varies from the Wiring Code.

All earth connections shall be lugged.

A3.14.1) SUPPLY EARTHING

An appropriately sized copper earth conductor in accordance with the requirements of SANS 10142 will accompany all power cables.

A3.14.2) SAFETY EARTHING

All cabinets (including doors) and equipment bodies shall be earthed and equipotentially bonded in accordance with SANS 10142.

A3.14.3) EARTH LEAKAGE UNITS

All circuits serving switched socket outlets shall be routed via an earth leakage unit. Any other circuit, as required by the Engineer will be routed via an earth leakage unit.

A3.14.4) MATERIALS

Earth conductors shall generally be stranded copper with green PVC insulation. The conductors shall conform to SABS 150 (current edition) quality specification for "PVC-INSULATED CABLES". All earth conductor sizes shall be determined in accordance with SABS 0142, paragraph 4.6 where the earth does not form an integral part of the cable.

Earth conductors for substations, cable trays and rising mains shall generally be copper bar or solid drawn copper rod (annealed). Conductor sizes, where not specified, shall be no less than the size determined in accordance with SANS 10142.

A3.14.5) SUB-DISTRIBUTION BOARDS & SUB-CIRCUITS

A separate earth connection shall be supplied between the earth busbar in each sub-distribution board and the earth busbar in the Main Switchboard.

The connections shall consist of bare or insulated stranded copper conductors installed along the same routes as the supply cables or in the same conduit as the supply conductors. Alternatively armoured cables with earth continuity conductors included in the armouring may be utilized where specified or approved.

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

A3.14.6) RING MAINS

Common earth conductors may be used where various circuits are installed in the same wiring channel in accordance with SANS 10142. In such instances the sizes of earth conductors shall be specifically sized and approved by the Engineer.

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

A3.14.7) CONNECTIONS

Under no circumstances shall any connection points, bolts, screws, etc., used for earthing be utilized for any other purpose.

It will be the responsibility of the Contractor to supply and fit earth terminals or clamps on equipment and materials that must be earthed where these are not provided. Unless earth conductors are connected to terminals, the ends shall be tinned and lugged.

A3.14.8) NON-METALLIC & FLEXIBLE CONDUITS

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

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

A3.14.9) WATER PIPES

Metal cold water mains shall be bonded by solid 12mm x 1,6mm copper strapping to the earth busbar in the Main Switchboard.

All other hot and cold water pipes shall be connected with 12mm x 1,0mm perforated or solid copper strapping (not conductors) to the nearest switchboard.

The strapping shall be fixed to the pipework with brass nuts and bolts and against walls with brass screws at 150mm centres.

In all cases where metal water pipes, down pipes, flues, etc., are positioned within 1,600mm of switchboards an earth connection consisting of copper strapping shall be installed between the pipework and the board.

In vertical building ducts accommodating both metal water pipes and electrical cables, all the pipes shall be earthed at each distribution board.

A3.14.10) ROOFS

Where service connections consist of overhead conductors, all metal parts of roofs, gutters and down pipes shall be earthed.

One bare 10mm² copper conductor shall be installed over the full length of the ceiling void, fixed to the top purlin and connected to the main earth conductor of each switchboard.

The roof and gutters shall be connected at 15m intervals to this conductor by means of 12mm x 1,0mm copper strapping (not conductors) and galvanized bolts and nuts. Self-tapping screws are not acceptable.

Where service connections consist of underground supplies, the above requirements are not applicable.

A3.14.11) PUSH BUTTON & ISOLATOR STATIONS

All isolator/push button stations shall be provided with an earth terminal. This shall be connected to the body of metal enclosures.

All fibreglass enclosures shall be similarly supplied with earth terminals. All exposed metal portions of equipment (push button shrouds, etc.) shall be connected to this terminal.

A3.14.12) TRUNKING & TRAYS

All metal trunking and cable trays are to be earthed.

A3.14.13) EARTHING & BONDING WIRE

The medium voltage switchboard, transformer earthing terminal and cable supports must be bonded to the main earth bar by means of 70mm² earth conductors.

The neutral busbar and earth bar in the main LV switchboard shall be bonded to the main earth bar with an earth conductor (or conductors in parallel) having a cross-sectional area of not less than half the size of the LV phase conductor (or conductors in parallel) between the transformer and the main LV switchboard.

In addition, a 70mm² copper earth conductor must be laid in the cable trenches along with all incoming and outgoing medium voltage cables for a distance of 40m (or as specified) and the conductors must be connected to the main earth bar.

A3.14.14) EARTH RESISTANCE MEASUREMENTS

Test the resistance to earth of each distribution board earth bar.

Carry out 'spot' tests on at least 5% of all sub-circuits to determine the impedance to earth of the sub-circuits' earth connection.

All test results are to be fully documented and forwarded to the Engineer in written form.

The Contractor must carry out earth resistance measurements on completion of the installation of the earthing electrode and the results must be submitted to the Engineer for approval.

Should the earth resistance be too high, the Contractor may be requested to install additional earth rods or trench earths, for which a variation order will be issued.

A3.14.15) LIGHTNING & SURGE PROTECTION – ELECTRONIC/COMMUNICATIONS SYSTEMS

The Contractor shall supply and install all the necessary lightning protectors, arrestors and other equipment to provide protection for both the equipment and people utilising this equipment. This equipment shall form part of the Works unless otherwise specified.

The guidelines laid out in the CSIR special report No. ELEK 165 - "A Lightning Protection Guide for Electronic Installations" shall be followed to protect all electronic and other equipment prone to suffer lightning surge damage.

All input and output circuits shall be equipped with surge protection so as to ensure that surges transmitted along the control cables do not affect the equipment.

All CCTV coaxial cables shall be provided with in-line surge suppressors.

All data communications cables which run between different buildings shall be protected at both ends by suitable lightning protection terminals.

The Contractor shall guarantee the entire installation against any damage that may be caused by lightning and static discharges and all necessary steps shall be taken to safeguard the equipment and the installation.

All mains lightning arrestors shall comply with the requirements of SABS 171 and shall bear the SABS mark.

The protection unit shall consist in essentials of a four terminal plus earth assembly containing coarse and fine protection. The fine protection shall consist of in-line impedances shunted by a silicon clamping device such as a transorb diode on the output terminals; coarse protection shall consist of two spark gaps in series across the incoming terminals with the centre point taken to earth (alternatively a 3 terminal spark gap is acceptable). In either case the signal lines shall remain decoupled from earth under normal conditions.

The unit shall be selected to have a voltage rating as close to, but above the normal line voltage and to safely carry the maximum expected line current. The internal impedances shall be rated to withstand a continuous short circuit on the output terminals without overheating or change in characteristics.

The nominal discharge surge current shall be not less than 10kA on an 8/20 impulse. The unit shall be capable of sustaining ten successive pulses of this value, at one minute intervals, without suffering a change of characteristic.

The protection level shall be such that the output voltage between terminals will not rise to more than 1,5 times the rated voltage within 1nS on the application of an input surge voltage of 10kV, 1,2/50 waveform or on a current surge of 5kA on a 8/20 wave, conductor to earth voltage shall not rise to more than 1,1kV under similar conditions.

The unit shall consist of a base which can be attached to a DIN rail and fitted with incoming, outgoing and earth terminals and into which the protection device is plugged. The plug-in assembly shall contain all the dynamic devices. It shall be possible to remove this part for remote testing without impairing the current loop in any way. The input terminals for the field cables shall be arranged to be at the bottom of the unit. The earth connection shall be as direct as possible and not less than 4mm² in cross section.

A.3.15) CABLE FASTENING

All cables shall be individually strapped onto trays with PVC cable ties or stainless steel cable ties where mounted externally. Cables shall be strapped at appropriate intervals to ensure that they are straight and sag free.

The correct spacing shall be maintained.

Kinking of cables is to be avoided.

A.3.16) GENERAL POSITION OF SWITCHES

Sockets with their controlling switches shall be mounted with the centre line 300mm above finished floor level, unless otherwise specified or if mounted in approved trunking.

Switches for lights are to be mounted with the centre line 1.4m above the floor, except where otherwise specified or indicated on a drawing.

Where walls are tiled halfway switches and sockets must be installed 40mm above the tiles.

Unless otherwise approved, the switches controlling lights and installed adjacent to doors are to be placed at the lock side of the door at a distance of 200mm from the door jam to the centre line of the box, in each case. If the lock side of a door is not shown on a drawing, it must be ascertained before the switch is positioned.

A3.16.1) LIGHT SWITCHES

Light switches generally shall be of the Crabtree type rated at not less than 16Amps and shall conform to SABS 163 of 1951 as amended. The switches shall have an Ivory type non-conductive cover plate in wet areas.

Where weatherproof light switches are called for, they shall be of the totally enclosed Rotary type. All light switches shall be mounted at a height of 16,5 brick layer's centre (1.4m).

A3.16.2) SWITCHED SOCKETS

Switched socket outlets generally shall be 16Amp 3-pin and of the Crabtree make. Surface outlets shall be installed into YORK fiberglass boxes with a sliding cover. Mounting heights for socket outlets shall be 300mm from floor level, unless specified or in power trunking.

A.3.17) CONNECTION OF LIGHTING FITTINGS & APPLIANCES

All high bay and fluorescent fittings will be supplied with a 3m flexible cord and 5Amp plug.

A3.17.1) LIGHT FITTINGS

Information as to type and position of light fittings will be given in finishing schedules or specified elsewhere in the RFQ.

Where it is necessary to supply lights from a ceiling mounted trunking, they will in general be supplied from a 5A unswitched socket outlet and a plug.

Unless otherwise specified, all outside lighting will be switched via a daylight switch-contactor combination.

A3.17.2) LAMPS

The sizes and types of lamps are specified in the SCHEDULE OF LUMINAIRES.

Where the Contractor is required to supply a luminaire, he will supply the appropriate lamp with it.

A3.17.3) ISOLATORS

Isolators in general shall be of the double pole type. Crabtree or similar and equal and approved will be accepted.

A3.17.4) LIGHTING LEVELS

The design of the lighting layout shall be such to conform to SANS 0114 with respect to the lux requirements.

A.3.18) CONNECTION OF DOMESTIC TYPE STOVES

The connection of each stove, except where otherwise specified, shall consist of 2x10mm² conductors and a 6mm² bare copper earth wire in 25mm conduit. A 60Amp double pole micro-gap isolator shall be flush mounted in a wall outlet box behind the stove in the run or the tubing, above or in the tile work, if any, but not less than 1.2mm above finished floor level. A 25mm conduit from the isolator shall terminate 300mm above the floor in such a position that it will be behind the stove. Wiring from the conduit to the stove shall be housed in a flexible conduit of the same diameter as the conduit used. The flexible conduit may be connected to the conduit by means of an extension ring and cover, a coupling or by means of a dome lid, with m.i. box.

A.3.19) CONNECTION OF GEYSERS

Each geyser shall be protected on the distribution board by means of a double pole circuit breaker. In addition, a recessed or surface-mounted 2 pole 30Amp isolator must be positioned adjacent to the geyser. Where the Wiring Code or regulations of the Local Supply Authority prohibit the installation of an isolator, the protection on the distribution board shall be a circuit breaker and neutral isolator combination.

The conduit connection is to terminate directly on the geyser in such a manner that it can be uncoupled from below. A flush round draw-box shall be provided close to the geyser. Flexible conduit may only be used where specifically approved.

The Electrical Contractor must ensure that all geysers are installed to allow for easy removal of elements and thermostats. The geyser outlet steelwork or mounting lug must be earthed, in addition to any earthing terminal in the geyser connection box. The use of copper tubing as an earth path is not acceptable.

A.3.20) INSTALLATION OF DISTRIBUTION BOARDS

All distribution boards shall be installed with the top edge 2m above finished floor level, unless otherwise specified. The Electrical Contractor is to supervise the actual building-in of trays to ensure a neat installation and shall, after placing in position of any tray, provide wooden struts inside the tray to prevent any deformation of tray sides during building operations. All boards shall be accurately level in all planes.

All distribution boards shall be cream coloured. Where there is a requirement for emergency and UPS supplies, the following will apply:

- The distribution board shall have compartments for mains, emergency and UPS sections and they shall be electrically and mechanically separate.
- The arrangement for the boards shall be from left to right, main section, emergency section and the UPS section. Each section shall be provided with its individual doors. All equipment, including the main switch shall be behind hinged doors. Each door shall be clearly labeled.

The final colour of the boards shall be as follows:

- Distribution Board Outside: Cream
- Main Section: White
- Emergency Section: Red
- UPS: Yellow

A legible label will be fixed on the distribution board door stating the distribution board name, where it is supplied from and the size of the supply cable.

All other warning labels shall be affixed in the appropriate fashion.

A.3.21) BUILDING DAMAGES

On completion of the contract, any damage to plastering, floors, ceilings, wood and paintwork, etc. during and because of the electrical installation shall be made good to original finishes by the Electrical Contractor.

A.3.22) UNINTERRUPTIBLE POWER SUPPLY (UPS)

All UPS equipment to be installed by the Contractor will in general be free issued to him.

Switched socket outlets serving UPS powered equipment shall consist of a 16Amp plug with a flat earth pin.

The 16Amp socket outlet units shall be supplied complete with a plug top. The plug top and the socket outlet shall be red in colour. Each circuit shall be protected as per specification.

A.3.23) TELEPHONE INSTALLATION

Conduits from the telephone DB to various telephone points shall be 25mm and shall be complete with draw wires. Every telephone point must have a separate conduit from the distribution board. Looping is not permitted.

Unless mounted in trunking, all telephone points shall terminate in a 100x50x50mm flush conduit box.

All telephone connection boards shall be 600x600x150mm. The telephone connection boards shall be complete with architrave and door with two flush fitting twist locks. A full size 20mm thick hardwood mounting board shall be provided in each board.

The boards shall be fitted with a label with 10mm white engraved letters on black background "TELEPHONE BOARD" with two screws.

The colour of the telephone connection board is to be white.

A.3.24) COMPUTER (DATA) INSTALLATION

Data cabling will be installed in dedicated conduits and trunking enclosures. All computer connection boards shall be 600x600x150mm. The computer connection boards shall be complete with architrave and door with two flush fitting twist locks. A full size 20mm thick hardwood mounting board shall be provided in each board.

The boards shall be fitted with a label with 10mm white engraved letters on black background "COMPUTER BOARD" with now screws.

The colour of the telephone connection board is to be grey unless otherwise specified in the project drawings.

A.3.25) SUPPORTING BRACKETING & FIXING

The drilling of holes in structural steelwork is not permitted except with prior written approval of the Engineer.

The drilling of holes in vessels or process pipe work is prohibited. Welding on any vessel of process pipe is prohibited, however clamping on process pipe work can be accepted if its design is approved by the Engineer.

A.3.26) EQUIPMENT ISOLATORS

All machinery, control panels and motor circuits are to have a lockable MAIN SWITCH, which shall be able to be switched off and locked out in the off position.

A.3.27) PREFERRED EQUIPMENT LIST

The trademarked equipment is to be used when tendering for installation work. Any deviation must be approved by the Engineer or his representative.

A3.27.1) ITEM MANUFACTURER

- Distribution Boards SABS Approved
- PVC-Insulated Conductors SABS Approved
- PVC-Insulated Cables SABS Approved
- Conduits & Accessories
- Light Switches
- Plug Sockets
- Moulded Case Circuit Breakers
- Earth Leakage Units
- Isolators
- Light Switches (Waterproof)
- Cable Ladder
- Wiring Channels
- Power Skirting
- Contactors
- Local Isolators
- Time Switches
- Transformers
- Ht Switchgear
- Welding Sockets
- Cable & Core Markers
- Push Button & Control Gear
- Motor Control Gear
- Proximity Switches
- Ups Units
- Power Supplies

- Enclosures
- Terminals
- Relays

A.4) INSPECTION & TESTING

A.4.1) GENERAL REQUIREMENTS

Complete functional and operational tests shall be carried out on all of the Contractor's work as may be described by the Engineer at that time. The Engineer or his representative reserves the right to be present at these tests. Such inspections shall not relieve the Contractor of his responsibility for meeting all requirements of the inspection and it shall not prevent subsequent rejection if such material or equipment is later found to be defective.

To ensure that wiring may be easily withdrawn from any circuit run, the Engineer may, at his own discretion, direct that wires be withdrawn by the Contractor. If these wires are withdrawn easily without showing damage, the costs of withdrawal and replacement will be borne by the employer, otherwise the Contractor will rectify this at own expense.

The Electrical Contractor shall furnish a test report detailing particulars of at least the following tests executed:

- a) High voltage test of 2,000V, 50Hz, AC for one minute between phase and earth in turn with the remaining phases earthed.
- b) A 1,000V megger test on all insulated sections, from phase-to-phase and phase-to-earth. Resistance readings shall exceed 1,000 megohms.
- c) Full operational tests of all equipment according to drawings on circuits.
- d) A trip test on all earth leakage units by creating an earth fault to appropriate magnitude.
- e) A current injection trip test on all main breakers to ensure that they trip at their set current.
- f) Earth loop resistance tests on all earthed equipment.
- g) Checking of all polarity on all switched outlets.
- h) Such other tests as may be laid down in the "Detailed Requirements" or "Schedules"

A Certificate of Compliance (COC) according to the Act shall be issued for the complete installation.

A.4.2) TESTING OF MEDIUM VOLTAGE CABLES AFTER INSTALLATION

A4.2.1) PROCEDURAL

Within fourteen days of the completion of a cable installation and jointing the Contractor shall arrange for a pressure test on all new and re-routed MV cables and shall provide all necessary test equipment and instruments. Pressure tests are to be carried out before and after connections to switchgear are made.

The Contractor shall establish the requirements of the Supply Authority as regards both testing and witnessing of tests before commencement of tests.

All tests are to be carried out in the presence of the Engineer and the Contractor shall record all results and confirm in writing.

All tests shall be reported on in an agreed format and individual megger readings are to be presented for each cable tested.

A4.2.2) TEST VOLTAGES – PILC CABLES

After installation of MV PILC cables, test each length of cable for continuity and insulation in accordance with the following table:

Cable Rating (kV)	TEST VOLTAGE (Applied for 15 minutes) (kV)			
	Paper-Insulated cables			
6,6 11	Between Conductors		Conductors to sheath	
	AC (r.m.s.)	DC	AC (r.m.s.)	DC
	12	18	12	18
	20	30	20	30

A4.2.3) TEST VOLTAGES – XLPE CABLES

The values, magnitudes and testing procedures for XLPE insulated cables differ significantly from those accepted for PILC cables. If the latter methods are used significant initial or latent damage will occur.

The leakage resistance of each core shall be accurately measured and recorded using a Megger type DC instrument generating a voltage of not less than 500 and not exceeding 5000 volts. The values shall be not less than $(2U + 2)$ MΩ/km e.g. for 1km cable operating at 11kV the minimum acceptable insulation resistance is 24MΩ.

The integrity of the sheath shall be verified by the application of 5kV DC for 1 minute between earth and the inner metallic sheath. A current of 1mA/km is acceptable.

An overvoltage test shall be applied to the cores prior to energisation, as switching a circuit breaker onto a fault could be hazardous to the operator as well as causing severe damage to the equipment.

The overvoltage shall be produced by either:

A sine wave voltage in the range 25-100Hz

A sine wave or square wave voltage at 0.1Hz approximately

and applied for 60 minutes at the magnitudes shown below in kV between the three conductors connected together and the screens and armouring tied together to earth.

	Cable operating voltage kV			
Applied Test Voltage kV	6.6	11	22	33
Power Frequency	8	13	25	38
Very Low Frequency	11	19	38	57

The cable shall be discharged through a resistance of 200kΩ and then earthed for 5 minutes.

In the event that the capacity of the mains frequency test set is adequate or a VLF set is unavailable a DC test is permissible under the following conditions:

The duration of the test shall not exceed 10 minutes.

The cable shall be discharged through a resistor of 200kΩ and then solidly earthed for 24 hours.

Discharging the cable by applying a short circuit can cause severe damage.

	Cable operating voltage kV			
Applied Test Voltage kV	6.6	11	22	33
DC Voltage kV	6	10	20	30

Prior to energisation the leakage resistance shall be measured as in 2.1. Any significant reduction shall be reported to the engineer.

The terminal load (e.g. transformer) must be connected and switched in prior to closing the source circuit breaker as the energisation of an unterminated line can cause voltage doubling to occur at that position.

A.5) SHIPPING

The assembly shall be suitably crated and packed for the transport system to be used. If the transport of the assembly to site is included in the contract it shall be the responsibility of the Contractor to ensure that the crating and packaging is suitable. If transport is excluded from the contract, the crating and packaging shall be done in accordance with the instructions of the transporter. The proposed crating and packaging system shall be approved by the Engineer, but this approval shall not relieve the Contractor of any of his responsibilities. The costs of preparation for shipping will be included in the vendor's price.

The vendor is responsible to ensure that no damage will be sustained while shipping and he will prepare the appropriate packaging to ensure this.

The datasheet shall indicate whether the vendor is to deliver the equipment to site and whether the vendor is to offload the equipment on site or if the delivery and offloading on site shall be carried out by a third party.

Where delivery and/or offloading by the vendor is specified on the datasheet, the costs thereof shall be included in the vendor's price.

A.6) INSTALLATION

The datasheet shall indicate whether the vendor is to install the equipment in its final position on site or if the installation shall be carried out by a third party.

Where installation by the vendor is specified on the datasheet, the costs thereof shall be included in the vendor's price.

The Contractor shall provide and carry out everything necessary to complete the whole installation and put it into service. Full details and drawings of the equipment are to be obtained by the Contractor. Where necessary in the opinion of the Engineer the Manufacturer or Suppliers of the equipment are to provide engineering assistance at the Contractor's expense to enable any difficulties experienced with the equipment during erection, connecting, testing, putting into service or operating, to be overcome to the satisfaction of the Engineer. The Contractor shall advise the suppliers the time and extent of the engineering assistance required.

Before erection commences, the equipment shall be inspected by the Contractor and properly cleaned to remove the protective coverings and coatings supplied before dispatch from the Manufacturer's works. Examine all components for visible signs of damage and report all damage in writing to the suppliers with a copy to the Engineer.

The Contractor shall carry out the erection, including cutting holes for holding-down bolts, positioning and grouting holding down bolts in accordance with jigs or drawings supplied observing all erection instructions and precautions for erection that may be issued by the Manufacturer or supplier of the equipment.

The Contractor is to make sure that complete switchboards have been properly aligned vertically and horizontally and that all bolts and connections between panels and/or busbar joints and other mating parts have been properly assembled. All bolts and other fastenings are to be tightened and the Contractor is to ensure that all cubicles will receive the switchgear units correctly and that there is no distortion which will result in poor appearances and difficulties in operating the equipment.

The paintwork is to be touched up with matching paints supplied by the Manufacturers.

All wedges and packings installed at Manufacturer's works to prevent damage to moving or delicate components during transport are to be removed.

Check from the Manufacturer's drawings that all instruments and components are correctly connected.

Busbar covers are to be removed and all connections and tap-offs are to be checked and all loose connections tightened. Check support insulation for defects or damage and replace faulty insulators. Remove any dirt, tools and loose materials from the busbar chamber before replacing covers.

A.7) COMMISSIONING

The datasheet shall indicate whether the vendor is to allow for a site technician to be present when the equipment is commissioned and energized. In such a case the vendor's site technician will:

- Conduct the site tests as described in Section 4 above.
- Conduct voltage tests on the equipment, after the equipment is energized and adjust the tap changer so that the equipment delivers the required output voltage.

A.8) DRAWINGS & DOCUMENTATION

Prior to work commencing, the tenderer shall receive a copy of drawings the Engineer deems relevant for tendering. The successful tenderer shall receive all relevant drawings before work commences and in the event of updates on drawings, the Contractor shall receive such copies for construction. In the case of design/drawings required from the Contractor, all working drawings will be submitted to the Engineer for his approval before commencement of work.

The Contractor shall in any case provide the Engineer with all "as built" change notes as gathered/identified during installation and commissioning on mechanical and electrical work (including wiring diagrams) as a pre-requisite to final payment. "As built" drawings shall be maintained on a current basis as work in progress.

The Contractor shall be responsible for providing all the necessary drawings for approval by the Engineer. Unless otherwise specified all drawings shall be done to the IEC drawing standards using IEC symbols.

The Engineer may provide reference drawings, as listed in the data sheet for information to the Contractor. These could include amongst others, single line diagrams, actual or typical schematic diagrams, control system drawings or schedules etc.

The Engineer may require a single schematic diagram for each functional unit type or require separate schematic diagrams for each functional unit and this preference shall be expressed in the data sheet.

General arrangement (GA) drawings shall indicate the physical size of the assembly, the space required around the assembly for operation, transport unit sizes, positions of the functional units and the foundation arrangement. It shall also detail the overall mass of the assembly as well as the mass per transport unit.

Typical schematic drawings are preliminary drawings generally done per functional unit type and issued for information, comment and or preliminary approval. They shall in all cases be developed into detailed drawings for construction.

The Contractor shall provide one set of the manuals for all components contained in the assembly (preferable in electronic format on a CD).

A.9) QUALITY ASSURANCE

A.9.1) CERTIFICATION

The vendor shall supply a comprehensive QA/QC Plan in accordance with ISO 9001:2008, as part of his bid or prior to manufacture, as indicated on the data sheet.

All equipment manufacturers shall have valid SANS 9000 certification.

A.9.2) QUALITY PLAN

The Contractor on receipt of a contract for the manufacture of switchgear and controlgear assemblies shall compile and submit a quality plan which shall be approved by the Engineer prior to commencement of manufacture.

The quality plan shall list all major operations, specifications, verifications, tests, methods of test and equipment to be used and acceptance/rejection criteria.

The quality plan shall list all major operations, specifications, verifications, tests, methods of test and equipment to be used and acceptance/rejection criteria.

A.9.3) ACCESS

The Engineer's representative shall have access at all reasonable times to those parts of the manufacturing facilities engaged in the manufacture of articles to this specification. The representative is authorised to witness any stage of the manufacture and testing and inspect documentation. The representative is authorised to reject any items not complying with the requirements of this specification. In the event of a dispute arising regarding interpretation of test results the decision of the Engineer shall be final.

A.10) GUARANTEE

All equipment and materials shall be guaranteed against defect for a period of twelve months, from the date of mutually agreed successful hot commissioning, fair wear and tear accepted.

Tenderers shall submit a written undertaking at the time of tender that a complete range of spares for the equipment offered will be held by the manufacturer for a minimum period of 10 years from the date of tender.

SUMMARY
GREENSTONE MALL - ELECTRICAL TENDER

ELECTRICAL SERVICES BOQ		15 Sept 25	
SAT286/25 - Refurbishment and Upgrade of SA Tourism Head Office			
ITEM	DESCRIPTION	SUB-TOTAL	TOTAL
1	BILL No 1 - ELECTRICAL P&G's		
a	Total Value Related P&G		
b	Total Fixed P&G		R -
c	Total Variable Related P&G		R -
2	BILL No 2 - MAIN MV & LV RETICULATION		R 175 000.00
3	BILL No 3 -SMALL POWER & LIGHTING SERVICES		R 517 000.00
4	BILL No 4 - DAY WORKS & OVERTIME RATES		
5	BILL No 5 - PROVISIONAL SUMS		R 110 600.00
6	BILL No 6 - SUM TO FIX PRICE IN TERMS OF JBCC CONTRACT		
7	SCHEDULE OF VARIATION RATES FOR PROJECT		
8	Total Carried forward to Form of Tender (Excl VAT)		R 802 600.00

BILLS OF QUANTITIES : MECHANICAL WORKS

G4260 PROJECT SPRINGBOK - AIRCONDITIONING AND VENTILATION BOQ

	Quantity	Fixed	Value Related	Time Related
Section 01: Compliance with Contract				
Allow for costs directly associated with expenses to comply with the Conditions of Contract and the Main Contract Preliminaries, excluding the items detailed below	SUM	R -	R -	R -
Section 02: General	SUM	R -	R -	R -
Section 03: Drawings and Submissions	SUM	R -	R -	R -
Section 04: Work Provided by Others	SUM	R -	R -	R -
Section 05: Compliance with Standards and Regulations	SUM	R -	R -	R -
Section 06: Safety	SUM	R -	R -	R -
Section 07: Hoisting and Rigging	SUM	R -	R -	R -
Section 08: Programming	SUM	R -	R -	R -
Section 09: Contract Management	SUM	R -	R -	R -
Fixed cost component	SUM	R -	R -	R -
Component variable with time for completion (per month)	SUM	R -	R -	R -
Section 10: Contract Management	SUM	R -	R -	R -
Site Establishment	SUM	R -	R -	R -
Fixed cost component	SUM	R -	R -	R -
Component variable with time for completion (per month)	SUM	R -	R -	R -
Travelling & Transport	SUM	R -	R -	R -
Section 11: Protection Against Damage	SUM	R -	R -	R -
Section 12: Access to Equipment and Systems	SUM	R -	R -	R -
Section 13: Cleaning and Start-up	SUM	R -	R -	R -
Section 14: Testing, Balancing, Commissioning, Operation of Plant and Handover	SUM	R -	R -	R -
Section 15: Guarantee	SUM	R -	R -	R -
Section 16: Quality Management System, Testing and Inspection	SUM	R -	R -	R -
Section 17: Operating and Maintenance Manuals	SUM	R -	R -	R -
As Built Drawings	SUM	R -	R -	R -
Section 18: One Year's Maintenance	SUM	R -	R -	R -
Section 19: Special Attendance	SUM	R -	R -	R -
Section 20: Preparation of Pre-Start up Checklist	SUM	R -	R -	R -
Section 21 : Completion of Subcontract work	SUM	R -	R -	R -
SUBTOTALS FOR ABOVE	-	R -	R -	R -

TOTAL PRELIMINARIES R -
SUBTOTAL GROUND FLOOR BOQ R -
SUBTOTAL FIRST FLOOR BOQ R -
SUBTOTAL ROOF BOQ R -

GRAND TOTAL (excl VAT)	R -
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BILLS OF QUANTITIES : WET SERVICES

Project:	SAT286/25 Refurbishment and Upgrade of SA Tourism Head Office				
Location:	Sandton, Johannesburg				
Date:	16 September 2025				
N/S Works:	WET SERVICES BILL OF QUANTITIES			TENDER	
Item	Description	Unit	Quantity	Rate	Total
	BILL NO.1: PRELIMINARIES AND GENERAL				
1	General Preliminaries in accordance with the JBCC: Fixed, time and value related costs all inclusive of commissioning and as built documentation and handover documentation, testing and inspections, conveying, delivering, unloading, storage etc complete for the full project duration to be agreed with the main contractor	Sum	1.00		
	The P&G value shall also be inclusive of the following:				
	O&M Manual and As-built Drawings Supply 2 x Hardcopy and 1 x softcopy O&M manuals. Manual to include all valve and equipment specifications and maintenance schedules. All sanitaryware specifications. All piping specifications. As-Built drawings. Plumber and equipment suppliers contact details.	No	1.00		
	Testing and Disinfection Testing of entire drainage system throughout the building all in accordance with SANS 10-400 part P & testing of entire water reticulation system all in accordance with SANS 10-252	No	1.00		
	Camera Inspection for a single day use, inspection by contractor	Days	1.00		
	Piping and valve labelling Labelling of all valves, water and drainage pipes according to Plumbing tender specification	No	1.00		
	Supplementary Preambles Refer to the full list of supplementary preambles. Pricing for such is deemed to be included in the P&G and/or tender rates	Item	1.00		
	SUB TOTAL : BILL No. 1				
	BILL NO. 2: SANITARY DRAINAGE				
	High Density polyethylene (HDPE PN4) piping fastened vertically in plumbing ducts or suspended from slabs, brackets and sockets to be included in price per running meter of piping, pipes to be butt welded:				
	56mm pipes chased in walls	m	30.00		
	56mm pipes	m	35.00		
	110mm pipes	m	40.00		
	Extra over High Density polyethylene (HDPE PN4) piping vertically in ducts for fittings, all fittings to be priced including:				
	56mm Bend 90 degree	No	20.00		
	56mm Bend 45 degree	No	40.00		
	56mm ring seal socket	No	20.00		
	110mm x 56mm reducing junction	No	5.00		
	110mm Bend 45 degree	No	40.00		
	110mm Junction swept or Y	No	20.00		
	110mm Female end cap	No	16.00		
	110mm Inspection Pipe	No	8.00		
	110mm Vent Cowl	No	2.00		
	HepVo Valve, 50mm	No	4.00		
	Connection into existing	No	10.00		
	SUB TOTAL: Bill No. 2				
	BILL NO. 3: WATER RETICULATION				
	Multi-Layer Piping Multi-layer water supply pipes installed suspended in ceiling void/ vertically in ducts and/ or chased in walls, Geberit Mepla Multi-layer piping, including straight couplers and approved rubber lined brackets in the running lengths				
	20mm Pipe	m	100.00		
	20mm Pipe chased in walls	m	100.00		
	26mm Pipe	m	80.00		
	26mm Pipe chased in walls	m	20.00		
	32mm Pipe	m	30.00		
	40mm Pipe	m	10.00		
	Extra over mutli-layer crimp fittings				
	20mm Fittings	No	228.00		
	26mm Fittings	No	150.00		

32mm Fittings	No	20.00		
40mm Fittings	No	10.00		
SUB TOTAL: Bill No. 3				
<u>BILL NO: 4 PIPE INSULATION AND CLADDING</u>				
Insulation to all hot and hot water return pipes, cold water pipes also to be insulated where exposed to the atmosphere. Insulation to be installed by specialist				
Superlon or similar flexible slide-on or slit Snap-On pipe insulation. Insulation to comply with SANS 10400-XA where piping with internal diameter of 50mm or less needs to have an R-value (Thermal Resistance – m2.K/W) equal or exceeding 1 and piping with an internal diameter exceeding 50mm needs to have an R-value equal or exceeding 1.5 with a ODP =0. Minimum thickness of insulation 25mm for piping up to Ø50mm and thereafter 40mm thick insulation for piping exceeding Ø50mm. Insulation to bends and brackets to be included in the price per running meter. Thickness below based on Superlon				
Insulation to 26mm Pipes: 25mm thick insulation	m	20.00		
SUB TOTAL: Bill No. 4				
<u>BILL NO. 5: HOT WATER GENERATION</u>				
Stiebel Eltron DCE-X 6/8 Premium, installed to manufacturers specification.	No	4.00		
SUB TOTAL: Bill No. 5				
<u>BILL NO. 6: VALVES, STRAINERS, PRVS AND WATER METERS</u>				
SABS Approved Brass lever type Ball Valves, Cobra 1090 Ball O Flo FxF Ball Cock or Geberit MLP Brass ball valves				
20mm Ball valves c/w male iron adaptors to MLP, complete	No	20.00		
25mm Ball valves c/w male iron adaptors to MLP, complete	No	1.00		
32mm Ball valves c/w male iron adaptors to MLP, complete	No	1.00		
20mm Auto air release valve complete with shut off valve below c/w male iron adaptors to MLP, complete	No	3.00		
Strainers				
Strainer, Hot forged brass bodied - stainless steel 304 removable mesh. 16bar operating pressure "Y" type FxF such as Crane or similar SABS approved fittings				
20mm Strainer, complete	No	4.00		
SUB TOTAL : Bill No. 6				
<u>BILL NO. 7: SANWARE AND BRASSWARE</u>				
Refer to Sanitary ware and Brass ware quantities measured in Bill. Plumbing contractor to allow for the following costs but not limited to - Procure, collection, take delivery and sign for, delivery to site, safe and secure storage as required to meet the program, take to point of installation, install as per item measured in this Bill, hand over in good condition and working order, protect after installation until signed handover, commissioning and testing measure elsewhere.				
Sanitary and Brassware				
WC, Complete				
WC - In wall cistern including pan, cistern, flush plate and seat	No	14.00		
Take delivery of and install the above - complete as per discription	No	14.00		
MIP WC - In wall cistern including pan, cistern, flush plate and seat	No	1.00		
Take delivery of and install the above - complete as per discription	No	1.00		
IE pan connector and female/male iron	No	15.00		
WHB, Complete				
WHB - underslung basin, mixer,flexi connectors, angle valves, waste union including trap	No	14.00		
Take delivery of and install the above - complete as per discription	No	14.00		
15mm Female wall plate elbow - Connect to MLP	No	28.00		
MIP WHB - wall hung basin, mixer,flexi connectors, angle valves, waste union including trap	No	1.00		
Take delivery of and install the above - complete as per discription	No	1.00		
15mm Female wall plate elbow - Connect to MLP	No	2.00		
Urinal, Complete				
Urinal, flushing mechanism, waste, trap	No	4.00		

Take delivery of and install the above - complete as per discription	No	4.00		
15mm Female wall plate elbow - Connect to MLP	No	4.00		
Urinal Divider, wall hung	No	2.00		
Take delivery of and install the above - complete as per discription	No	2.00		
Sink, Complete				
Sink - Double bowl sink with tap hole including deck mounted mixer, angle valves, waste union and trap	No	2.00		
Take delivery of and install the above - complete as per discription	No	2.00		
Female wall plate elbow - Connect to MLP	No	4.00		
Prep Bowl, Complete				
Prep Bowl - Bowl with tap hole including deck mounted tap, angle valves, waste union and trap	No	2.00		
Take delivery of and install the above - complete as per discription	No	2.00		
Female wall plate elbow - Connect to MLP	No	2.00		
SUB TOTAL : Bill No. 7				
SUPPLEMENTARY PREAMBLES				
The tenderers are referred to the separate document project specification before pricing this bill and to ensure that all materials and installation practices are compliant to the minimum requirements.				
This Bill of Quantities forms part of the contract documents and is to be read in conjunction with the project specification.				
All works billed here shall include for the full scope of service specified including but not limited to supply, delivery, installation, commissioning, documentation, building tuning, project closeout and administrative requirements, and all works as necessary to provide a working product in accordance with the project performance criteria.				
Large discrepancies between quantities on site and this Bill are to be flagged by the contractor. All discrepancies shall be brought to the attention of the responsible engineer. Should no queries be raised the contract totals and rates provided shall be deemed sufficient for the due execution of the works in accordance with the engineers intent communicated through the project drawings and these specifications.				
No variation in rates shall be due based on variation in quantities, rate of exchange or escalation.				
Errors and omissions of equipment or material required to execute the project solution specified or indicated on the drawings shall be brought to the attention of the responsible engineer for clarification, failing which the provision of such items shall be deemed included in the project rates.				
All works required to execute the scope of works in accordance with the project program and quality requirements are deemed included in the rates and totals provided below.				
The bill of quantities shall not be used as the basis for material order.				
All values shall be quoted in South African Rands and exclusive of VAT.				
Stainless steel basins, sinks, wash troughs, urinals, etc				
Stainless steel for economy basins, domestic sinks and worktops shall be Type 430 (17/0) Stainless steel for urinals, basins, quality sinks, wash troughs, institutional equipment, etc shall be Type 304 (18/8) Stainless steel for laboratory sinks, photographic equipment, etc shall be Type 316 (18/8) Units shall have standard aprons on all exposed edges and tiling keys against walls where applicable.				
Sealing of edges				
Outer edges of sinks, basins, baths, urinals, etc are to be sealed against adjacent surfaces with approved silicone.				
PVC-U pipes and fittings				
Sewer and drainage pipes and fittings shall be jointed and sealed with butyl rubber rings Soil, waste and vent pipes and fittings shall be solvent weld jointed or sealed with butyl rubber rings and all in compliance to the Plumbing tender specification document.				
All Underground drainage to be Unplasticized polyvinyl chloride piping (UPVC Class 34) installed below ground in trenches. Excavation, back filling and				
Suspended PVC-U drainage in areas not sensitive to noise				
All soil and waste piping in areas indicated as "not noise sensitive" or indicated and described as such by the Engineer to be Unplasticized polyvinyl chloride piping SV suspended from concrete slabs. Brackets and sockets to be included in price per running meter of piping (UPVC SV).				
Copper pipes				
Pipes shall be hard drawn and half-hard pipes of the class described. Class 0 (thin walled hard drawn) pipes shall not be bent. Class 1 (thin walled half-hard), Class 2 (half-hard) and Class 3 (heavy walled half-hard) pipes shall only be bent with benders with inner and outer formers. Fittings to copper waste, vent and anti-syphon pipes, capillary solder fittings and compression fittings shall be "Cobra Watertech" type. Capillary solder fittings shall comply with ISO 2016.				
Copper pipes are to be installed in accordance with the latest revision of the Code of Practice for Copper Plumbing soldering techniques. Flux, solder, etc to be strictly in accordance with the manufacturer's requirements with special attention to copper flux composition				
Reducing fittings				
Where fittings have reducing ends or branches they are described as "reducing" and only the largest end or branch size is given. Should the contractor wish to use other fittings and bushes or reducers he may do so on the understanding that no claim in this regard will be entertained.				
Galvanised Mild Steel Domestic water pipes				
All Galvanised Mild Steel Domestic water supply pipes to be in compliance with SANS 62 and to be installed suspended from concrete slabs and vertically in ducts, brackets and socket/couplers to be included in running length per meter.				
Fixing of pipes				
Unless specifically otherwise stated, descriptions of pipes shall be deemed to include fixing to walls, etc, casting in, building in or suspending not exceeding 1m below suspension level. Where water supply pipes are to be cast in concrete, it will only be permitted to take place within u-PVC sleeves cast in and to be of size and quantity as measured in this Bill.				

	Paper wrapping to pipes			
	Pipes chased into brickwork must be wrapped with two layers of stout brown paper tied with wire and to be included in the rate per running meter of piping. Rates are to include for wrapping around joints and fittings.			
	Petrolatum anti-corrosion tape			
	Pipes to be taped shall be coated with the appropriate primer and the tape shall be applied in the appropriate widths and with 30% overlaps. Couplings and fittings to pipes shall be taped in strict accordance with the manufacturer's instructions and as applicable and required by the Engineer and Manufacturer's standard recommendations.			
	Prices for wrapping of pipes shall include for all work as described to couplings in the length.			
	Laying, backfilling, bedding, etc of pipes			
	Pipes shall be laid and bedded in accordance with manufacturers' instructions and trenches shall be carefully backfilled, all underground drainage rates to include for excavation and carting away of surplus materials.			
	All penetrations through slab larger than 75mm will be protected by use of Fire Stop Collars and will be as per the Fire Engineers Specification documents			
	General			
	Descriptions of pipes laid in and including trenches and of inspection chambers, catch pits, etc shall be deemed to include excavation, bedding, backfilling, compaction to a minimum of 95% Mod AASHTO density and disposal of surplus material on site.			
	Descriptions of WC pans, slop hoppers, etc shall be deemed to include for joints to soil pipes (pan connectors are separately measured).			
	Provisional quantities			
	The quantities in this bill are provisional and will be re-measured on completion of the contract and valued at bill rates.			
	As-built drawings			
	Where required, the contractor shall prepare an updated set of as-built drawings. At completion of the contract the contractor shall hand these drawings to the principal agent for reproducing onto the originals for handing over to the employer (provision for allowance of as-built drawings elsewhere).			
	Insulation and cladding			
	All Hot and cold water piping to be thermal insulated and cladded to protect against UV where exposed to the elements. Refer to plumbing tender specification document for minimum "R" values and also to be pre-scribed by specific pipe manufacturer, and in accordance with SANS regulation.			
	Sanitary ware			
	All Sanitaryware to be installed to the manufacturers specification			
	FINAL SUMMARY			
1	Preliminaries and General			
2	Sanitary drainage			
3	Water reticulation			
4	Pipe insulation and cladding			
5	Hot water generation			
6	Valves, strainers, PRV's and water meters			
7	Sanitary ware and brassware			
	Sub-total: excl. VAT			
	Add VAT at 15%			
	TOTAL Carried to form of tender			

BILLS OF QUANTITIES : FINAL SUMMARY

FINAL SUMMARY

<u>DESCRIPTION</u>	<u>PG</u>	<u>AMOUNT</u>
BUILDING WORKS	R	-
ELECTRICAL INSTALLATION	R	-
MECHANICAL INSTALLATION	R	-
WET SERVICES INSTALLATION	R	-
SUB-TOTAL	R	-
CONTINGENCY - EXCLUDED	R	-
TOTAL (EX VAT)	R	-
PLUS 15% VAT	R	-
TOTAL (INCL VAT) CARRIED TO FORM OF TENDER	R	-